

Church Universal and Triumphant

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Draft Environmental Impact Statement

Montana
Department of Health
and
Environmental Sciences




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Montana Department of Health
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Draft
Environmental Impact Statement

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Park County

February, 1988

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In accordance with the Montana Environmental Policy Act, Section 75-1-101, et. seq., MCA, and the Montana laws regarding Public Water Supplies, Section 75-6-101, et. seq., MCA and ARM 16.20.401, Food Establishments, Section 50-50-102, et. seq., MCA and ARM 16.10.3, Trailer Courts and Tourist Campgrounds, Section 50-52-101, et. seq., MCA and ARM 16.10.7 and Work Camps, Section 50-52-102, et. seq., MCA and ARM 16.10.9, the following environmental impact statement was prepared by the Department of Health and Environmental Sciences concerning a request for the approval of plans submitted to the department by the Church Universal and Triumphant near Corwin Springs in Park County, Montana.



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SUMMARY

The Department of Health and Environmental Sciences (DHES) decided to initiate the state's environmental impact statement (EIS) process to address the Church Universal and Triumphant's (CUT or the Church) proposed developments in the Corwin Springs, Montana, area.

This document is the draft EIS. If substantive comments dictate, a final EIS will be written before a concluding recommendation is made by the DHES.

The principle purposes of an EIS are to compile a factual record to aid the department in making an environmentally informed decision and provide a means for public information and comment. This draft imparts as much information as possible about the proposed projects, with both pro and con comments accompanying the factual information. The draft gives interested parties an opportunity to submit substantive information to expand the body of knowledge and correct factual material.

In many instances the Church was asked to provide information to the department. That material was either presented in total or edited to derive the most important information. If this material needs clarification or correction, the draft EIS provides the means for doing so.

The structure of the impact statement is dictated by the rules implementing the Montana Environmental Policy Act (MEPA). Reviewing the **Table of Contents** might help some persons better understand the organization of the information. Sometimes reading a particular section first might lead to greater understanding. In this case, reading the **Social and Cultural Uniqueness and Diversity Section** will give those not familiar with the history of the Church a better idea of its creation, organization and aims.

Another consideration is the presentation of information. The detailed discussions about the many elements considered in the EIS occurs under the general headings of **The Physical Environment** and **The Human Environment**. Rather than repeat those discussions, the portions of the EIS that weigh positive and negative impacts--beginning with **Primary, Secondary and Cumulative Impacts**--condense the detailed information to the most important facts and considerations.

Some of the areas of greatest interest in the EIS include:

Wildlife

- Some of the small, nonmobile wildlife have, and will be, displaced by construction activities.
- It appears the migration routes of the larger, mobile wildlife in and out of Yellowstone National Park (YNP) should not be greatly affected by the Church's proposals since the activities are occurring in or near areas of established development.
- Fencing will restrict domestic livestock to specific areas.

- Waste material that could attract wildlife will be properly disposed.
- Hunting and fishing on Church property will continue to be on a permission basis.

Fish

- By using proper construction techniques, it is unlikely the proposed developments will impact the fishery in the Yellowstone River and its tributaries.
- The aquatic life in several of the streams could improve if the Church and state and federal agencies can form agreements to maintain minimum stream flows.

Water

- By having plans and specifications for public water and wastewater systems approved by the DHES, water quality in the area will be maintained.
- Based on long-range scientific projections, wastewater will have an "unmeasurable" effect on the aquatic life in the Yellowstone River.

Aesthetics

- The area near Corwin Springs will appear more urban, but the new facilities at the Spring Creek site should not be visible to travelers along U.S. Highway 89.

Unique Environmental Resources

- Until the Church decides to use its water well across from La Duke Hot Springs, there probably will not be any concerted effort to investigate the possible impacts on the geothermal resources in YNP.

Historical and Archaeological Sites

- A thorough survey of the Church's property and adjacent land in the Corwin Springs area resulted in the identification of a number of historical and archaeological sites.

Economic Considerations

- The Church is the fourth leading taxpayer in Park County. It and its members do use public services, even though the Church provides some comparable services. It also does a considerable amount of business in Park County.

Transportation

- The Church is working with the county to upgrade unsurfaced roads and control dust.

- If the Corwin Springs Bridge across the Yellowstone River can eventually be upgraded, the heavy vehicles that now must use the county road between Gardiner and the ranch (west of the river) will be able to cross at Corwin Springs.

Planning

- Park County residents have chosen not to implement any form of comprehensive county plan or special planning district in the Corwin Springs-Gardiner area.

Copies of the EIS will be available in public libraries throughout Park County and in the Bozeman Public Library. Copies will also be sent to the State Library in Helena, and the university libraries at Montana State University, Bozeman, and the University of Montana, Missoula.

If you would like a copy of the impact statement or have any questions, write: Water Quality Bureau, DHES, Cogswell Building, Capitol Station, Helena, MT 59620 or call: 406-444-2406.

DESCRIPTION AND CURRENT ENVIRONMENTAL CONDITIONS

The Church Universal and Triumphant bought the Forbes Ranch in 1981. The property was purchased in the name of Royal Teton, Ltd. At that time the Church headquarters were located in the Southern California area. On July 3, 1986 the Church's international headquarters facility was unexpectedly sold after an unsolicited inquiry and a brief period of negotiations. The sale agreement required the Church to vacate its facilities by December 15, 1986.

Shortly after completion of the sale, the decision was made, and plans announced, to transfer the Church's headquarters to various locations on the Royal Teton Ranch (RTR). These development Plans required construction of a number of new facilities in addition to existing facilities, primarily in the vicinity of Corwin Springs. Due to the size and nature of several of these facilities, some aspects required review and approval or licensure by the DHES.

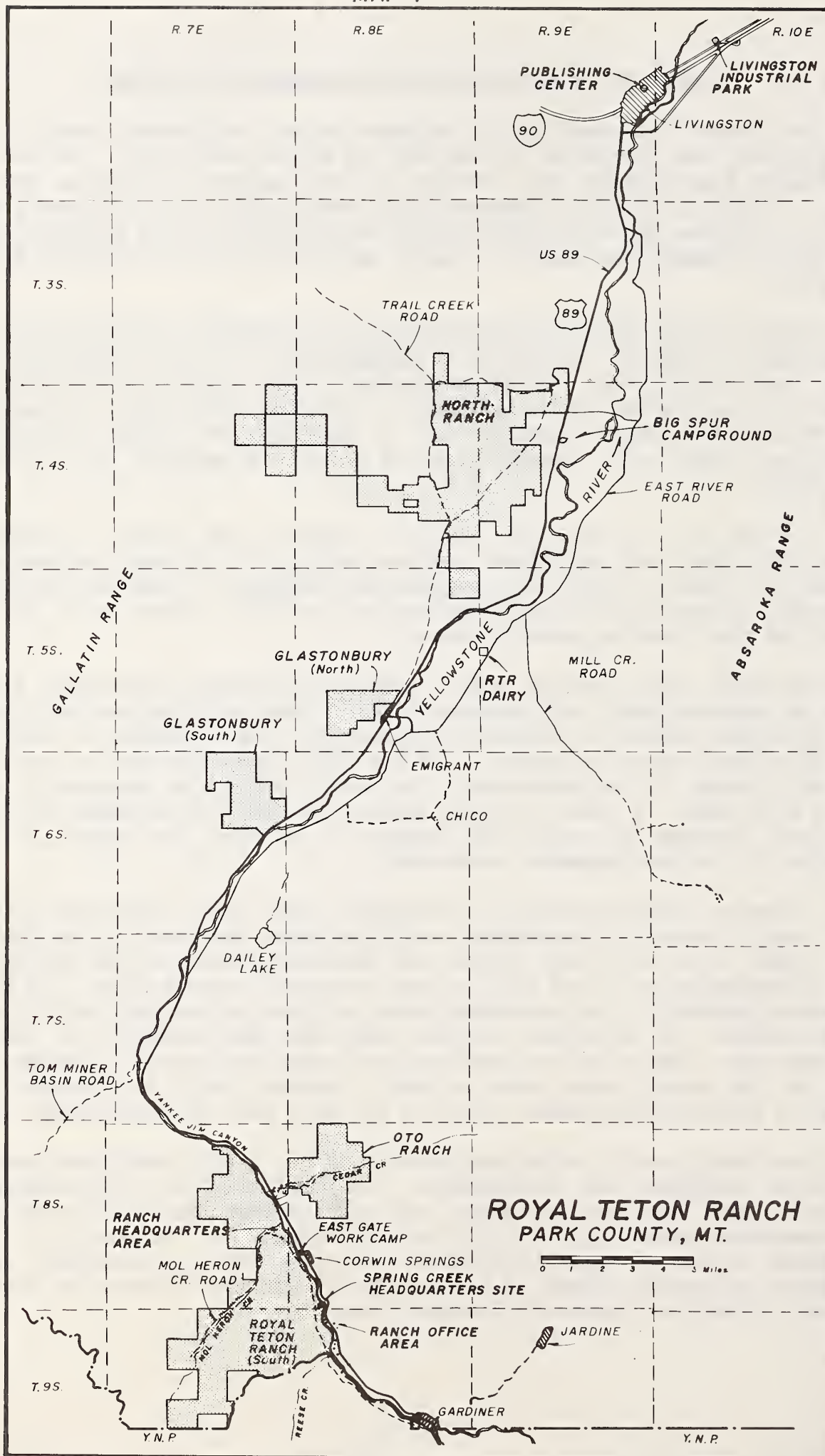
Montana law, in Section 75-6-112, requires that plans and specifications for water and wastewater systems serving 25 or more persons be reviewed for public health and engineering adequacy. Montana law further requires, in Section 50-50-102 and Section 50-52-101, licensing of both work camps and food handling establishments.

The DHES' Water Quality Bureau (WQB) is reviewing engineering information on proposed water and wastewater facilities and the Food and Consumer Safety Bureau (FCSB) is reviewing applications for licensing a "work camp" and food handling establishment. As the DHES proceeded with its review, it became apparent to the department that an EIS should be prepared in accordance with MEPA. A public scoping meeting was held on December 18, 1986 in Gardiner, Montana to assist the agency in defining the important issues relative to the environmental assessment.

Projects requiring review and approval have been identified as (1) a work camp license and residential water and sewer systems for the East Gate Work Camp, (2) a work camp license and the construction of the Spring Creek Church Headquarters, which will include water and sewer systems, (3) a water and sewer system for the slaughter house and food processing facility at the Ranch office, (4) expansion of the water and sewer systems at the Ranch Headquarters. Additionally, new water and sewer systems and licensed dining hall at the Royal Teton Ranch - North, located south of Livingston, are possible future developments, but will not be a part of this review. (Map 1)

The Church's main activities consist of (1) holding religious services, lectures, seminars and conferences, (2) publishing and distributing of religious writings, art and audio and video productions, (3) servicing an international membership and affiliate churches, (4) conducting a 12-week religious course of study for members, known as "Summit University" and (5) operating a private school (Kindergarten-12) for the children of staff and members, known as "Montessori International."

MAP 1



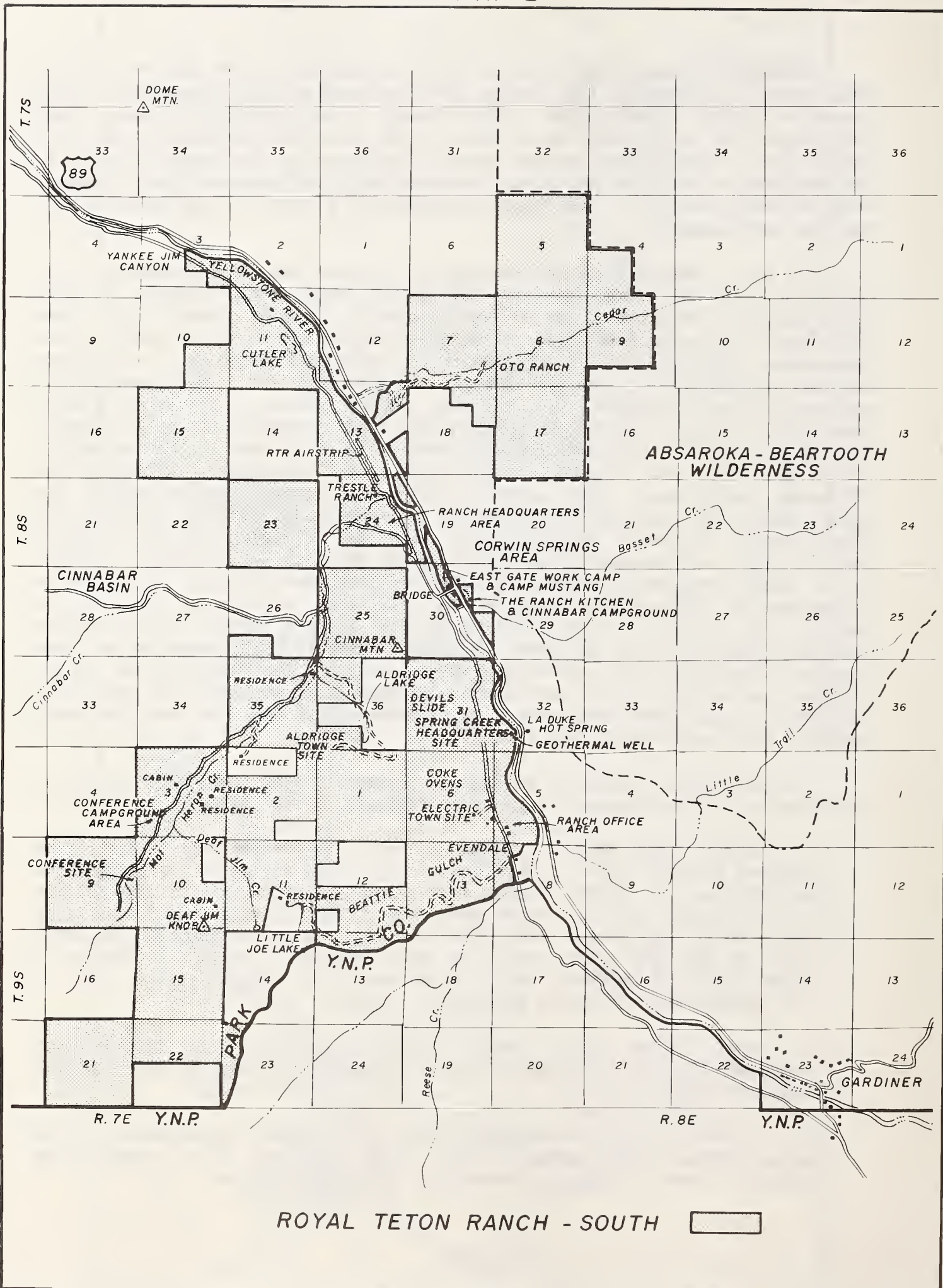
Royal Teton, Ltd., was a wholly owned subsidiary of the Church. It was established in September 1981 and by 1986 included a total ownership in Park County of about 33,000 acres. The "Ranch," even though its assets were transferred to the Church in December 1986 with the liquidation of Royal Teton, Ltd., remains the largest private taxpayer in the county outside of the Burlington Northern Railroad, Mountain Bell and Montana Power Company. None of the Church's or the former corporation's property has been claimed for tax exemptions.

The main ranch activities include (1) cattle and sheep ranching (currently a total of about 700 cows and 1,800 sheep), (2) farming of about 3,000 irrigated acres with traditional crops of alfalfa, grass, barley, oats and wheat, (3) a produce farm of about 80 acres and 2 green houses, with particular emphasis placed on growing carrots and potatoes, (4) poultry farming (currently a total of about 1,000 chickens and 1,500 turkeys) and egg production (currently a 1,000-hen laying flock), (5) dairy farming (currently a total of about 85 milking cows plus replacements), (6) processing facilities for farm produce for private on-farm use, (7) a restaurant known as "The Ranch Kitchen," with appurtenant campground known as the "Cinnabar Campground," both open to the public, and 2 nearby mobile home park/campgrounds operated primarily for private staff housing, known as the "East Gate" (formerly Camp Mustang) and the "Cinnabar Trailer Court," respectively, all located along U.S. Highway 89 at Corwin Springs, Montana, (8) a leased campground and mobile home park located 13 miles (mi) south of Livingston on Highway 89, known as the "Big Spur Campground," open to the public, (9) a rural 20-acre subdivision for members of the Church located west of Highway 89 near Emigrant, Montana, known as the "Community of Glastonbury," together with a 49-unit mobile home park subdivision known as the "Golden Age Village" (not completed) included therein, and (10) the maintaining of an in-house engineering and construction crew for farm and ranch projects and the planned Church facilities. (Map 1)

The Park County property includes a number of separate units located in the Paradise Valley between Livingston and Gardiner as follows:

1. Royal Teton Ranch - South (RTR-S) - approximately 12,000 acres located 4 miles north of Gardiner, mostly west of the Yellowstone River and Highway 89 (former Forbes Ranch) and adjacent to Corwin Springs. This includes the East Gate Work Camp, Spring Creek Church Headquarters, Ranch Office and Ranch Headquarters. Also included in the RTR-S area is the OTO Ranch which is approximately 3,300 acres located 8 miles north of Gardiner and 3 miles north of Corwin Springs, east of the Yellowstone River and Highway 89. (Map 2)
2. Royal Teton Ranch - North (RTR-N) - approximately 15,000 acres located 12 miles south of Livingston, west of Highway 89 and the Yellowstone River.
3. Community of Glastonbury - 2 units totaling approximately 4,500 acres (about 2,500 acres of which have not been sold) located near Emigrant, west of Highway 89 and the Yellowstone River.

MAP 2



4. Royal Teton Ranch Dairy - approximately 40 acres located near Pray, Montana, on the East River Road (old Highway 89), east of the Yellowstone River.

5. Big Spur Campground (leased) - approximately 10 acres located 13 miles south of Livingston, east of Highway 89 and west of the Yellowstone River.

6. Livingston Industrial Park (leased) - approximately 33 acres 4 miles east of Livingston, used for warehousing and storage (former Waggoner Park).

7. Former Burlington Northern (BN) Property - 2 buildings located on about 5 acres in Livingston, used for the Church's publishing activities.

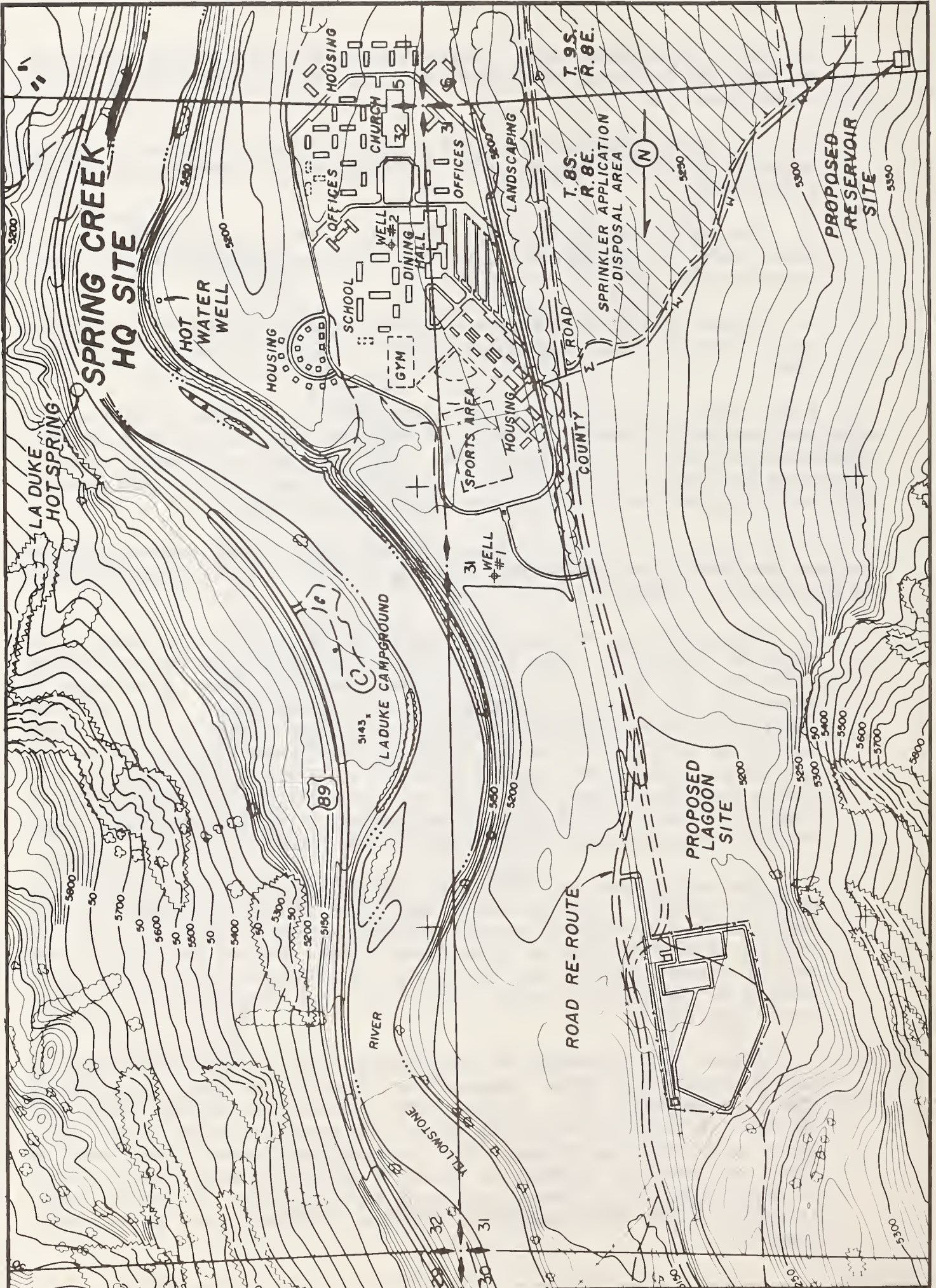
After confirming the sale of the California facilities, a site selection and preliminary master planning process for location of the Church's headquarters began in early July 1986. The goal was to select a site or sites for the location of facilities that would result in the most beneficial and efficient, and least harmful, land use decisions.

As a result of the site selection and preliminary master planning process, the Church has stated the following tentative decisions were reached in mid-August of 1986:

1. The publishing, distribution, data processing and warehousing functions of the Church, along with vehicle maintenance and cabinet making, would be located in Livingston. The staff for those jobs would be housed in the Big Spur Campground mobile home park. All of those facilities predate the Church's arrival in Park County in 1981. State and local government agencies approved the conversion of some of the recreation vehicle (RV) spaces to mobile home units at a ratio of 3 RV spaces to a mobile home unit. Prior to the conversion the park had 91 campground units and 12 mobile home spaces; after the conversion there were 21 campground units and 19 mobile home spaces.

2. The administrative, editorial and audio-visual functions of the Church, together with a church sanctuary, school buildings, dining hall, offices and other support facilities would be located at the "Spring Creek Site" on the Royal Teton Ranch. Summit University, when and if opened, would use the church building and some additional offices at the location also. This site is a completely new development. (Map 3)

3. Church staff working at the Spring Creek Headquarters would be housed primarily on site. Students and some faculty would be housed at the Cinnabar/East Gate (former Camp Mustang) locations at Corwin Springs, in existing facilities as well as by expansion to those facilities in modular buildings. The Cinnabar/Camp Mustang facilities at Corwin Springs also predate the Church's arrival in Park County. Total licensed capacity for these 2 adjacent facilities is: 27 mobile homes, 14 motel units, 95 recreational vehicles, 50 tent sites and a cabin. (Map 4)

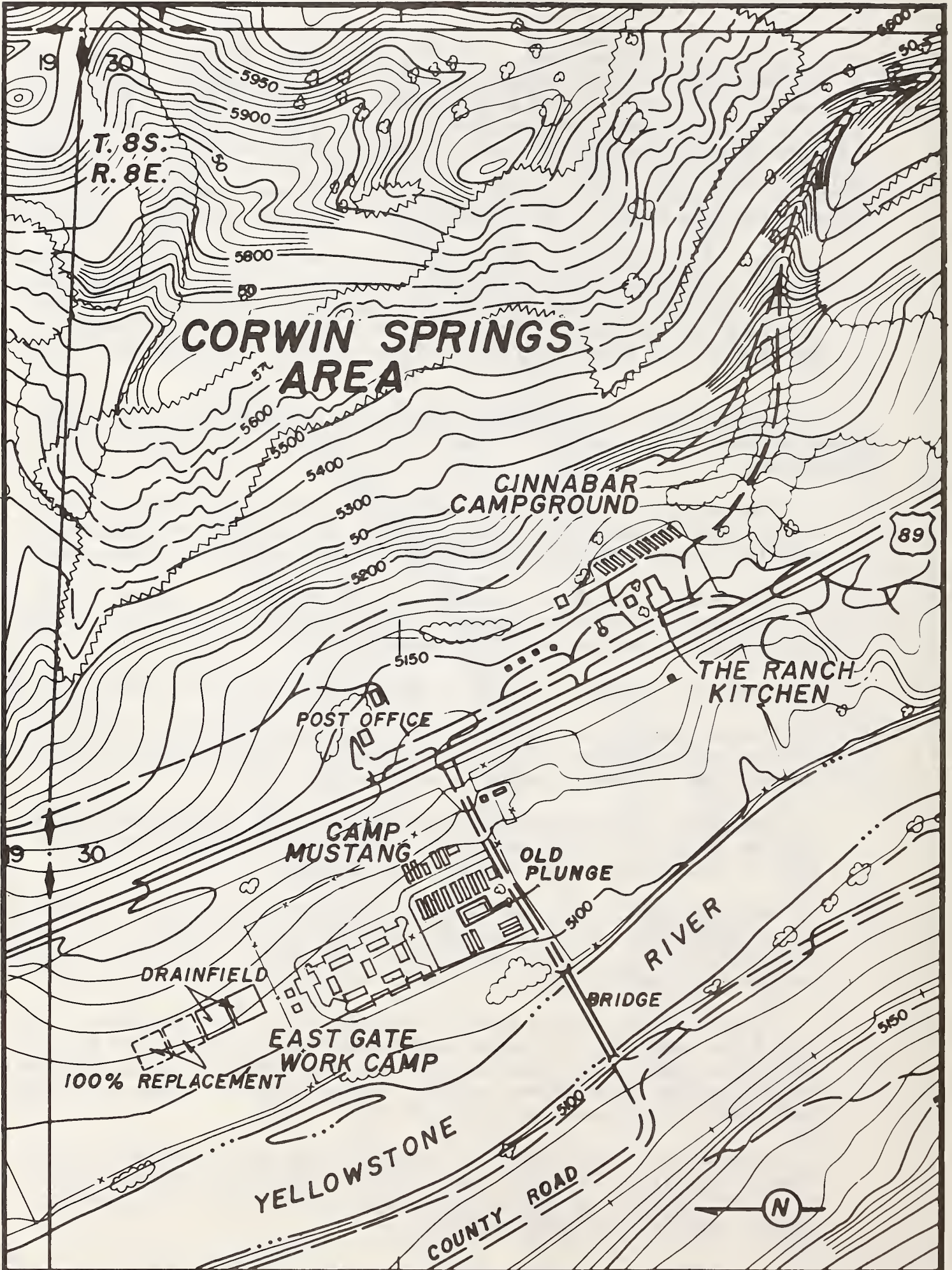


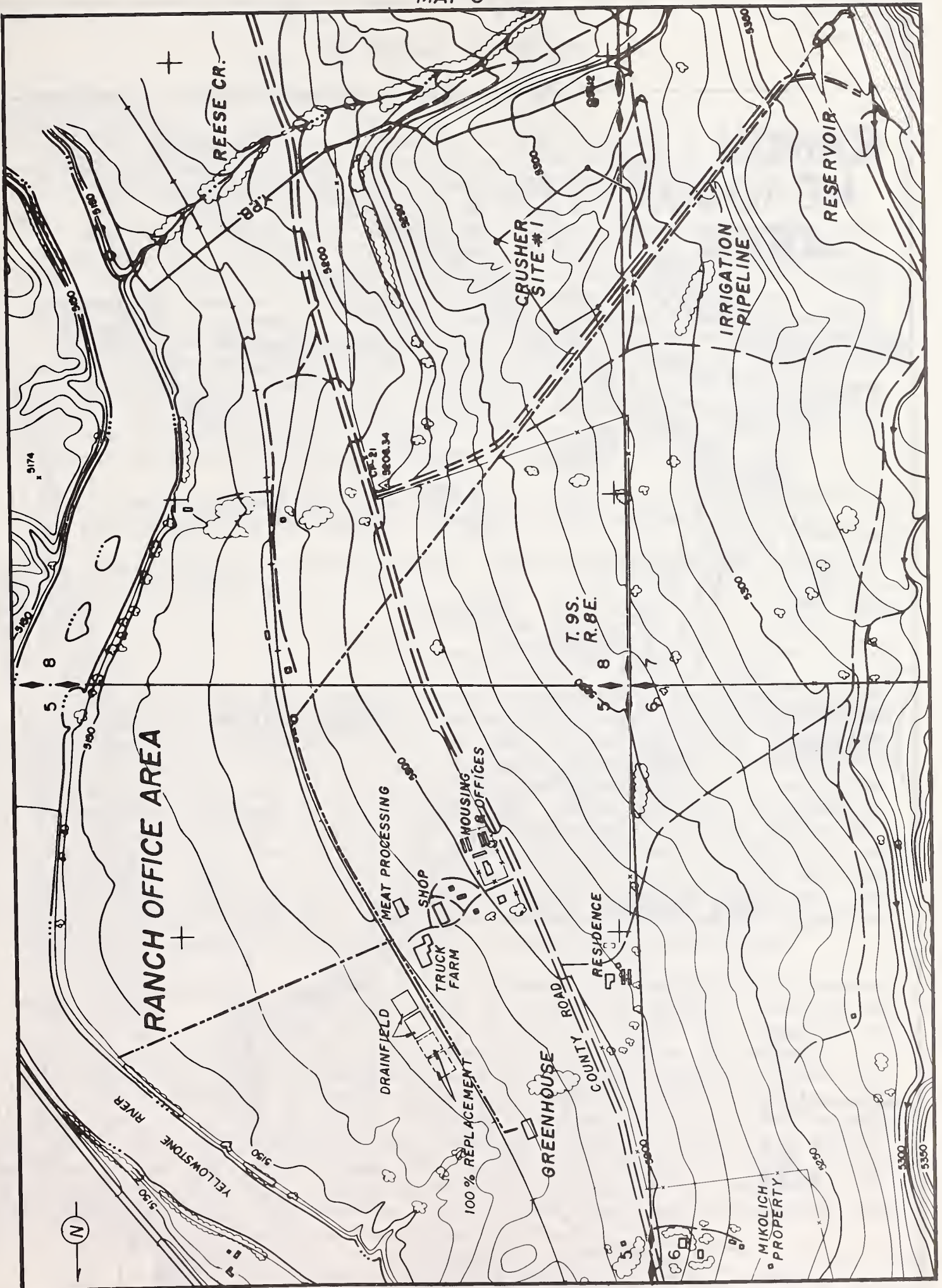
4. The "Ranch Office" area, located 3 miles south of Corwin Springs on the west side of the Yellowstone River, and the current location of administrative offices and shops, would be converted over a period of time to the produce farm headquarters only. Much of this development existed before the Church's arrival, except for several additions which have been made since then, including the greenhouses and several houses. A building for processing poultry and meat grown on the ranch and wild game hunted by staff members is just being completed. (Map 5)

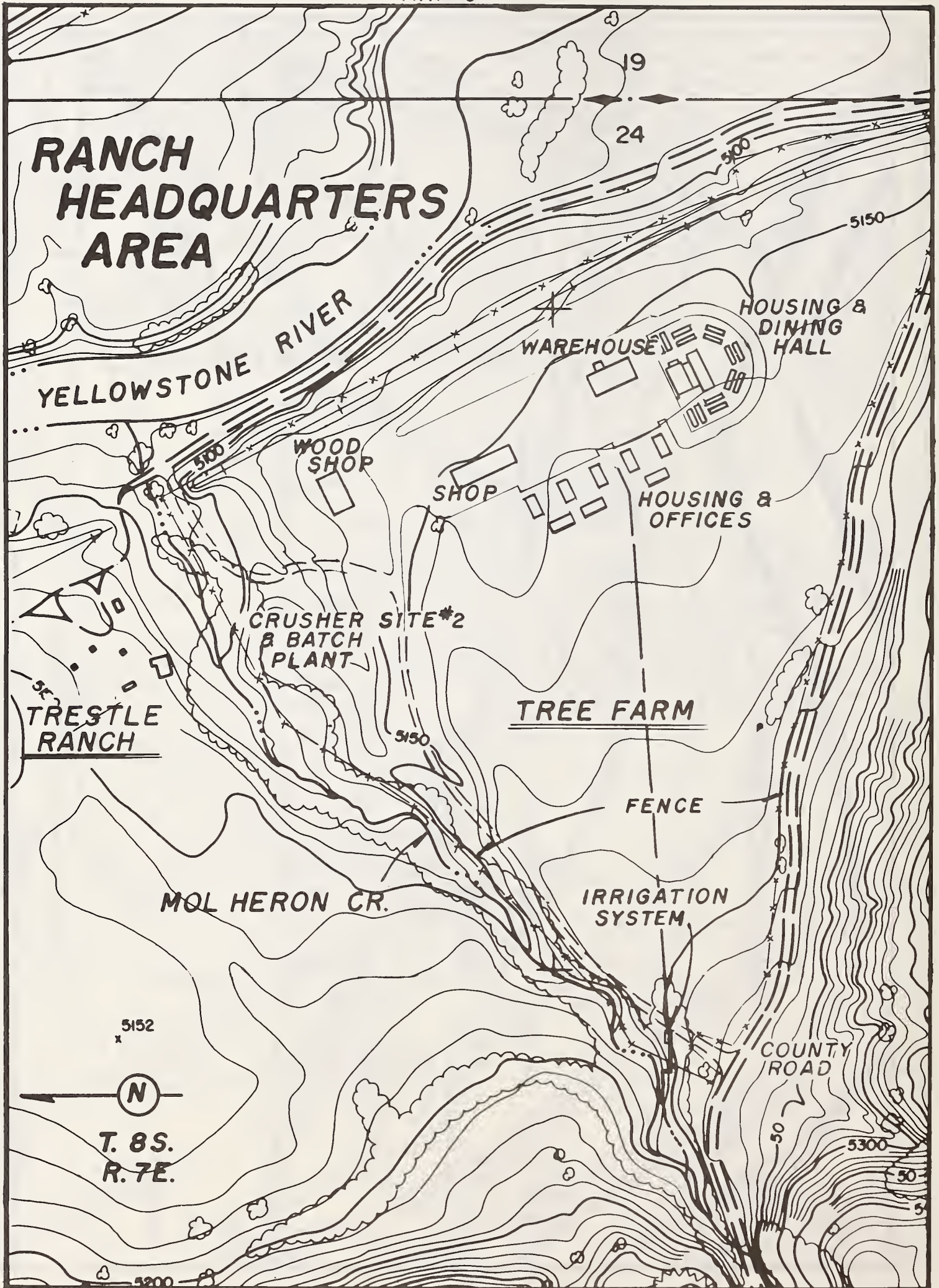
5. The "New Ranch Headquarters" area, located a mile north of Corwin Springs on the west side of the Yellowstone River, would be established as the permanent site of the ranch's administrative offices, maintenance shop and housing and dining facilities for farm and ranch workers. The facility was begun in 1983-84 and has not yet been completed. (Map 6)

In carrying out the design work for the total development, the Church stated it used, and continues to use, the following principles to guide development:

1. Development of housing and work areas is to be clustered in small units, with minimum impacts on valuable agricultural and rangeland, wildlife, views, aesthetics, roads, utilities and existing land uses.
2. The maximum amount of valuable land in agricultural usage (including cropland, pasture and range) is to be retained, and current levels of farming and ranching are to be maintained.
3. Areas of potential flooding or instability are to be avoided.
4. Visual impacts of and from any areas to be developed are to be avoided and minimized to the extent possible, as a benefit to ranch residents as well as to neighbors and passersby.
5. Changes to the predominantly rural character of the ranch with such impacts as bright lights, excessive traffic, loud noises and degradation of water and air quality are to be avoided.
6. Wildlife populations and key habitats on and around the ranch are to be preserved as an important aesthetic and economic resource. Historical levels of paid private and free public hunting and other recreational opportunities on the ranch will continue to be promoted.
7. Traffic flows on and around the ranch are to be minimized. The Church has undertaken a cooperative program with Park County to improve roads and control dust problems and has implemented a group shuttle service on the ranch between work and living centers. These are to be continued and improved upon in the future.
8. Dependence on and impacts to county services are to be minimized by developing private in-house capabilities for schooling, garbage collection and disposal, group transportation, fire control and emergency medical response for ranch residents.







THE PHYSICAL ENVIRONMENT

TERRESTRIAL & AQUATIC LIFE AND HABITATS

The Church's RTR-S is situated in an area abundant in terrestrial and aquatic wildlife. Its lands bordering YNP provide access to the many fish, birds and mammals that periodically move in and out of the park.

Due to the varieties of animal life and their interrelationships with people living in the area, the DHES asked the Church to provide the department with professional studies identifying the major species and discuss existing and possible future relationships between man and animals. The Church hired OEA Research of Helena, Montana, to prepare the reports. The consultants reviewed the concerns about wildlife expressed at the DHES's scoping meeting December 18, 1986, in Gardiner, conferred with persons from the State Health Department and Department of Fish, Wildlife and Parks (DFWP), then proceeded with their studies. In the course of investigation, OEA also contacted persons from the U.S. Forest Service (FS), National Park Service (NPS) and the Fish and Wildlife Service (FWS).

The DHES received the wildlife reports from the Church in June 1987. The reports were then sent to the DFWP for review and comment.

The following discussions include the reports from OEA and comments by DFWP and the Church:

WILDLIFE

EXISTING ENVIRONMENT

The Church Universal and Triumphant property being considered includes approximately 12,000 acres west of the Yellowstone River adjacent to YNP and approximately 3,300 acres on the east side of the river (the former OTO Ranch). Together, these properties are known as the RTR-S. The west side property includes most of the Mol Heron drainage and the divide and slopes between Mol Heron and the Yellowstone River to the east. The OTO property is located primarily within the Cedar Creek drainage. Elevation on the RTR-S runs from approximately 5,050 feet (ft) above sea level, to the north at the head of Yankee Jim Canyon, to 8,960 ft on the north ridge of Electric Peak in the upper reaches of Mol Heron Creek near the YNP boundary. The Church property varies from level benchlands along the river and creeks to the highly dissected mountainous country at the heads of drainages.

The property is important to many wildlife species during all seasons of the year. Thompson (1982) lists 59 species of mammal, 7 species of reptile and 3 species of amphibian occurring in a Montana latilong (a block of land 1 degree latitude by 1 degree longitude) number 39 (Appendix 1). Latilong 39 includes most of Park, parts of Gallatin, Meagher and Sweet Grass counties and all of the ranch property. Skarr et al. (1985) lists 235 bird species for this latilong. Of these, 159 species probably breed within the latilong, and 102 species may overwinter (remain throughout the winter) there. Because of the large size of the latilong (approximately 3,000 square miles [sq mi]) a tremendous variety of habitats is included. Obviously, not all these habitats occur on the RTR-S, and consequently, not all these species are expected to occur there.

Dennis Flath, DFWP, (1984) lists wildlife species (by county for mammals, reptiles, and amphibians; by latilong for birds) considered to be of special interest or concern, based on limited species numbers and/or habitat in Montana and in which elimination from Montana could be a significant loss to the gene pool of the species (DFWP 1986). This designation does not have any legal implications but does indicate DFWP concern for the species. In Park County, 9 species of mammal, no reptiles and 1 amphibian are included on the lists. For latilong 39, 23 species of birds are listed. Species of special interest or concern are listed in Appendix 1.

The FWS lists a threatened and 3 endangered species within an assessment area including the RTR-S (FWS letter) (see Threatened and Endangered Species Section of this discussion).

WILDLIFE OF PARTICULAR INTEREST

The following selections include discussions of a variety of biological parameters (home and seasonal ranges, habitat use, productivity, etc.) for wildlife of particular interest.

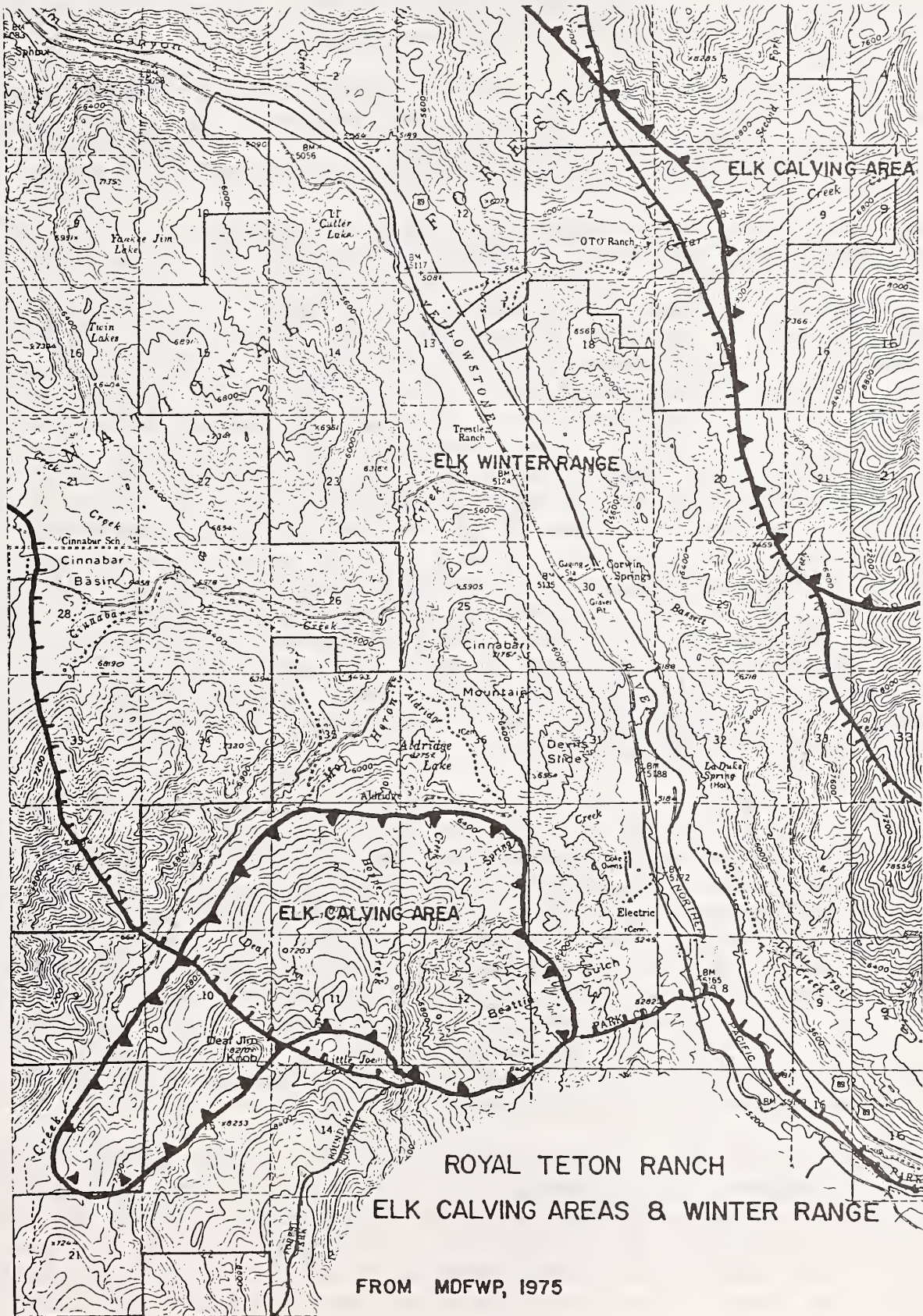
Elk

The RTR-S property lies within the traditional winter range of a portion of the Northern Yellowstone elk herd (Map 7). This winter range is estimated to cover 385 sq mi (100,000 hectares), of which 83% is within YNP boundaries, with the remainder on Gallatin National Forest, Montana State land and private property (Houston 1982). The DFWP estimates that there are 21,000 hectares of elk winter range outside the park (Chrest and Herbert 1985). Based on these estimates, the Church owns between 30% and 35% of the winter range outside YNP. This herd has fluctuated from about 4,000 in the late sixties (after a number of years of intensive reductions) to its present size of 16,000-17,000 elk (Despain et al. 1986). Carrying capacity of the winter range of the northern herd was estimated by Houston (1982) to be about 12,000 elk (10,000-15,000 range). Elk herds leaving YNP for northern portions of their winter range may be subjected to heavy hunting pressure. Late season hunts between the YNP boundary and Dome Mountain (roughly) to the north, generally begin in early December and end in mid-February.

The DFWP estimated that between 1981 and 1984, a mean of 33% of the 3,000-5,000 elk leaving the park were harvested. After the hunts, 2,000-3,500 elk were left on winter range outside the park (Chrest and Herbert 1985). The annual late season hunts are designed to reduce densities of elk on winter range outside the park, concomitantly increasing forage availability and enhancing the physical condition and survival potential of the elk.

Of the 3,000-5,000 elk which use the winter range north of YNP, only 500-1,000 are normally found on the RTR-S property at any given time during that period, including resident animals. The winter season may begin as early as November and last until May, depending upon the severity of the winter (Houston 1982). Also, the amount of winter range utilized increases

Map 7



according to this severity. During particularly severe storms, elk may move farther down the Yellowstone River than usual and occupy the range more densely than during the milder winters (Craighead et al. 1972; Shoemith 1979; Houston 1982). During these periods, greater numbers of elk may be found on the Church's property on both sides of the river.

During severe winter weather, when densities of elk on winter range are highest and they are on the range for longer periods of time, over-utilization of forage species may occur (Constan 1975). On Gallatin National Forest lands near Gardiner, the winter range is dedicated to elk use.

On these lands, where leases for domestic livestock are designed for minimal utilization by cattle or sheep and maximum use by wildlife, one concern is that wildlife species (primarily elk) are not able to use the range forage due to human disturbance (Chrest 1985). These disturbances manifest primarily in hunting, antler gathering and other forms of recreational activity (skiing, snowmobiling, hiking, etc.). Other influences on wintering elk may include construction, ranch activities, mining and logging. Preferred grazing occurs in areas closest to quality escape cover or in areas closed to hunting. Forage available during this time of year is primarily the previous season's growth. Antler gathering and other disturbance-type activities, which begin in accessible areas as early as March and last until elk are off winter range (as late as May in some areas), may exclude elk from some old-growth as well as some new-growth grass and push animals onto marginal range. This seasonal displacement may affect the physical condition of elk and limit productivity and development. Chrest (1985) has recommended that forest lands dedicated to wintering elk be closed to human travel until May 15 when elk would naturally leave the lower-elevation winter ranges. In areas where national forest lands are interspersed with private land (as on the RTR-S) this would be a very difficult administrative task.

During most years, the resident summer-fall nonmigratory elk herd on the RTR-S is usually limited to under 100 head (and infrequently up to 300). These animals select the higher-quality habitat (low road density, good forage and escape cover) at higher elevations, primarily in the Mol Heron drainage. Numbers of animals fluctuate as elk from YNP, Cinnabar and Tom Miner basins move back and forth through Church property. On the east side of the river, from 300 to 500 elk use the upper reaches of Cedar, Bassett, Sixmile and Bear creeks during summer-fall (USFS 1973). These areas around Monitor Peak are primarily Gallatin National Forest lands. Few elk are likely to be found on the OTO Ranch portion of Church property during summer-fall, but 50 or more animals are usually harvested in the Cedar-Bassett Creek area during hunting season (USFS 1973).

Elk hunting is restricted on RTR-S property. During general big game season (mid-October to late November), hunting on the property is limited to a hunting group which leases rights from the ranch, and to Church staff members. Thirty to 50 head of elk are taken from the RTR-S during this period. During the late season hunt (early-December to mid-February), approximately 6-10 bulls are taken, and hunters with antlerless elk permits are allowed to hunt free of charge on a portion of the ranch. Approximately 100 antlerless elk are taken during these hunts.

Mule Deer

Year-round habitat for mule deer exists on the RTR-S. They are associated primarily with the more mountainous country at higher elevations during spring, summer and fall, but move to the lower elevations of the foothills and the river bottoms during the winter (mid-November to May during severe winters) (Constan 1975).

During spring and summer, the deer are usually widely dispersed over the range, so no specific fawning areas have been pinpointed. On most mule deer spring-summer range in semiarid portions of Montana, fawning occurs in the upper and more mesic (moderately moist) reaches of small side-drainages-locations combining good, lush forage and escape cover (Biggins 1981). These conditions are adequately met at higher elevations on the RTR-S property on both sides of the river. Production in mule deer (fawns:100 does) has dropped from 73:100 does in 1983 to 43:100 does in 1985. At the same time, the harvest of mule deer in 1985 (974) was higher than any other year since 1974 (988) (Foss 1986). Numbers from production surveys and the 1986 hunting season are not yet available to confirm this.

A portion of the mule deer population (about 10-20 animals) remains near the agricultural land of the RTR-S during the fall and uses cropland on the benchland along the Yellowstone River.

Winter range for mule deer exists in an almost continuous band along the foothills and Yellowstone River bottomland north of YNP (including the RTR-S) and through the Paradise Valley (Map 8). More than 80% of this land is in private ownership, which creates some difficult management problems for DFWP (Constan 1975). Most of this range is shared with domestic livestock and elk, and in some instances (as on Church property) with pronghorn and bighorn sheep. Houston (1982) estimated 2,000 mule deer used winter range along the Yellowstone River on both sides of the YNP boundary in the late 1970s.

Competition between the various wildlife species and domestic livestock for available forage is quite high on private lands, like the RTR-S. Consequently, the forage/range condition on these lands is not always good. Diminishing high-quality forage is probably reflected in the general mule deer production downtrend during the last 3 years, but mule deer are increasing above Yankee Jim Canyon. Spring counts (Singer 1987) showed 811 mule deer above Yankee Jim Canyon in 1986 and 1,022 in 1987.

Mule deer hunting on the RTR-S has been treated more liberally than the elk hunting. Hunting for antlerless mule deer in hunting districts (HD) 313 and 314 has been available for free to "B" tag license holders during the general hunting season and has been encouraged on the RTR due to the large number of deer using the ranch during all seasons. Three hundred fifty "B" tags were issued for HD 313 during 1984 and 1985; and 600 "B" tags for HD 314. Hunter success was high during these hunts. Approximately 100 bucks and 300 antlerless mule deer have been taken during the past 2 hunting seasons on the RTR-S.

Map 8



White-Tailed Deer

White-tail numbers on and adjacent to the RTR-S are fairly low and appear to have been low for many years. Houston (1982) suggested that the YNP area is on the upper limit of marginal winter range for white-tails. White-tailed deer numbers increase along the Yellowstone River north of Yankee Jim Canyon (and the RTR-S) (Despain et al. 1986). They are infrequently observed on RTR-S property at the mouth of Mol Heron Creek and in the Aldridge area (Francis, personal communication [pers. comm.]) during any season (Map 8).

Hunting success for white-tails has increased in HD 313 from zero animals in 1976 to 33 in 1986 and in HD 314 from 9 to 169 (Foss 1986).

Bighorn Sheep

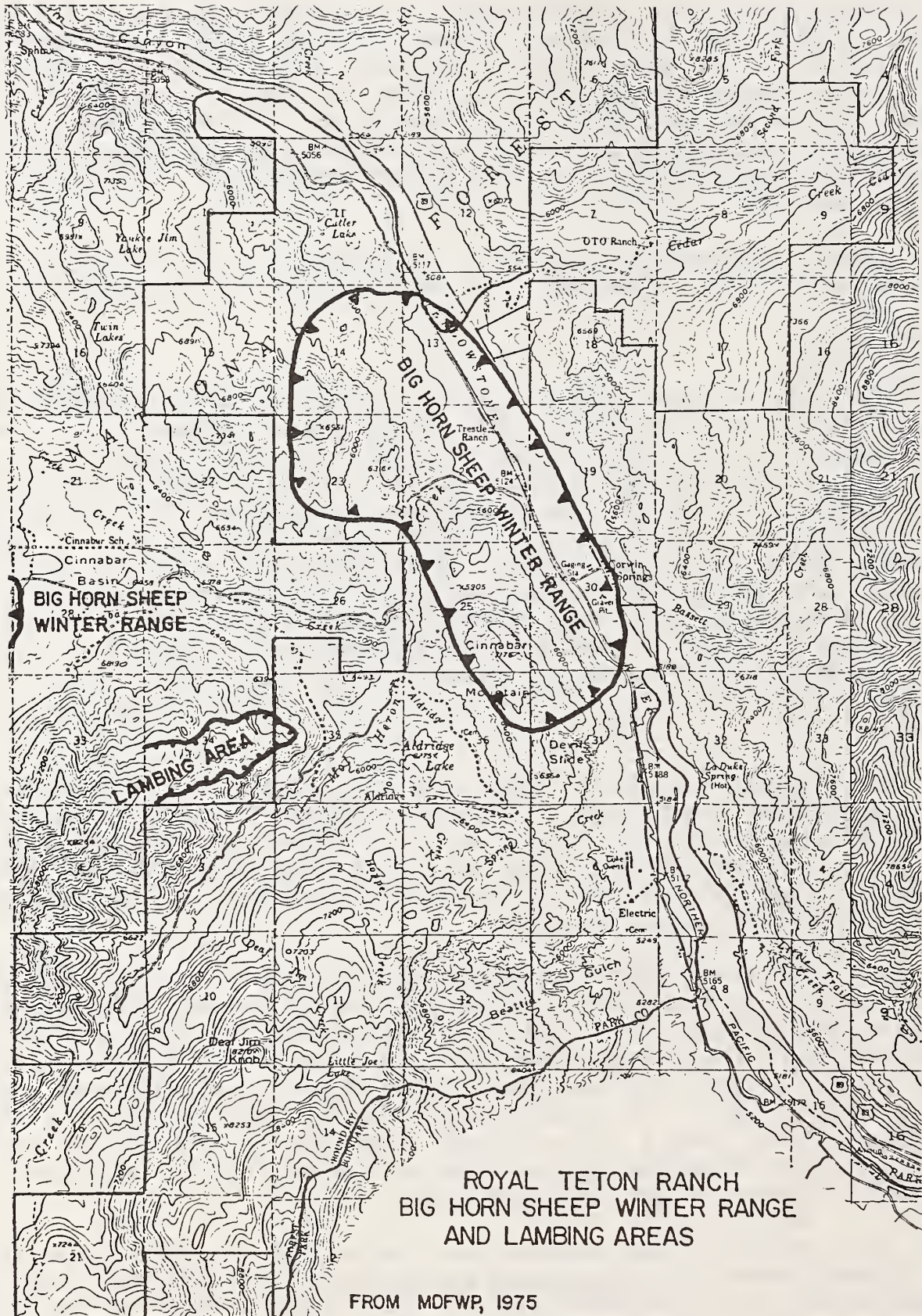
The bighorn sheep population which winters on RTR-S property on Cinnabar Mountain is a migratory herd which summers primarily in upper Mol Heron Creek on the slopes of Electric Peak. This herd (and other "satellite" sheep herds in this portion of the Gallatin Range) developed as an expansion of the YNP herd which historically occupied the country between Mt. Everts, Mt. Sepulcher and Electric Peak south of the YNP boundary (Keating 1982; Irby, pers. comm.). The sheep which colonized the Cinnabar Mountain area were probably attracted by the low snow cover, availability of escape terrain and relatively abundant forage (Keating 1982). The population of the Cinnabar herd has grown from fewer than 10 animals on the winter range in the early 1960s to a maximum of 131 animals during winter 1982-83. The herd in 1985-86, based on winter counts, was 92 sheep (Irby, pers. comm.).

Winter range for the Cinnabar bighorn herd (Map 9) overlaps with elk and deer winter range (Maps 7 and 8). Although a large portion of this range is Gallatin National Forest land, the bighorn are by no means restricted and spend considerable time on private land which is also grazed by domestic stock. Most wintering bighorn stay within a few hundred yards of steep slopes of Cinnabar Mountain.

The wild sheep frequently graze and water in the same pasture with Church cattle. The domestic livestock, on the other hand, are excluded from much of the national forest land and the bulk of winter bighorn forage by fences. One of the winter range areas of highest use by bighorn is a narrow flat (90-100 acres) which was planted with crested wheatgrass many years ago (Irby, pers. comm.). This strip of forage has been fertilized by the FS (Puchlerz, pers. comm.) in an attempt to increase grass quality and quantity. To date, there has been no apparent change in either the grass or the interest of sheep in the fertilized area.

There has been some concern that the quality of winter range occupied by bighorn sheep is compromised by wintering elk and has deteriorated significantly during winters when elk densities are high on the Cinnabar Mountain range (Constan 1972, 1975; Keating 1982; FS 1984). Range studies on this area have been conducted to determine the relative use of forage species by wintering elk on the bighorn range (Irby, pers. comm.), but the results are inconclusive at this time.

Map 9



During Keating's (1982) study in 1980-81 when winters were mild, a number of factors combined to suggest that the sheep population was a high-quality population (high lamb:ewe ratios, lamb suckling times, rapid ram maturation and low lungworm larval output), but more recently, Irby (pers. comm.) suggested that the general physical condition of the Cinnabar Mountain herd is poor to fair. Recent data (Irby, unpublished) show that the sheep are smaller in stature than sheep from many other populations in Montana and Wyoming, the herd is infected at very high levels with lungworm, productivity (measured as lambs:100 ewes) has dropped and the overall population has decreased (Irby, pers. comm.). Lamb production in the Cinnabar herd dropped to an all-time low of 13:100 ewes in 1983-84. The low ratio may have been related to a high number of ewes or high numbers of elk competing for winter forage or both (Swenson 1984). Keating (1982) suggested that during periods of high elk populations and severe winters, there is tremendous overlap in forage preference by elk and sheep. Irby (pers. comm.) has suggested, however, that it is difficult to determine whether factors negatively affecting the bighorn population are interspecific or intraspecific. There is speculation that the productivity can be increased through removal of part of the population. Based on 1 year's data, production increased from 25 lambs:100 ewes in 1984-85 to 44:100 in 1985-86 after removal of 13 sheep from the population in 1984-85 (Swenson 1985).

The proximity of the Cinnabar Mountain bighorn winter range to the county road through the RTR-S and visibility from U.S. Highway 89 attracts many wildlife photographers and enthusiasts (Irby et al. 1986). To the casual observer it would seem that the combination of daily Church traffic and the constant stream of curious wildlife watchers would cause the sheep to retreat from their favorite wintering areas. On the contrary, the sheep seem to pay little heed to human encroachment, with vehicles approaching within 100 meters and humans within 50 meters (Irby et al. 1986).

This low response level is maintained even though the sheep spend part of the winter on the same slopes with hunters stalking and shooting at elk, and hunters pursuing bighorns during the limited late season ram hunt on Cinnabar Mountain (2 to 3 permits during most recent years). On Ram Mountain in Alberta, research has demonstrated that bighorn are very sensitive (based on increased heart rate) to encroachment by humans or helicopters (Stemp 1982). This sensitization is difficult to relate to stress, but was shown to be directly correlated to low growth rates in some lambs. Sensitization levels also appeared to be higher in animals in poor physical condition. The studies on Cinnabar Mountain were not conducted with heart rate monitors, but based on behavioral indicators the bighorns do not appear stressed, even though they are not in good physical condition (Irby, pers. comm.).

Hunting for the Cinnabar Mountain bighorns occurs during 2 seasons. The general hunting season (September 1 to November 3 in 1985) in sheep HD 300 occurs on public land west of the RTR-S and is an unlimited hunting area. "Unlimited" refers to no-drawing permits being available to the general public. There are quotas on the number of sheep which can be killed (3 rams in HD 300 in 1985), and the season will be closed by the DFWP on 48 hours' notice when the quota is reached. In 1985, this season was closed on October 1. The late season hunt (November 4 to December 5, 1985) is designed to hunt the migratory population of sheep which is usually within YNP

boundaries during the general season. This season allowed 2 legal rams to be taken from their Cinnabar Mountain winter range adjacent to the RTR-S. As a rule, the late season rams have larger horns and are older animals than the rams taken during the general season hunt.

Pronghorn Antelope

Historically and prehistorically, pronghorn antelope coexisted along the Yellowstone River in YNP and to the north with bison, bighorn sheep, mule and white-tailed deer and elk (Lahren 1971). Elimination of bison and significant reductions of bighorn, deer and pronghorn occurred during the 1870s and 1880s until (by 1900) YNP supported the last remnants (500-800) of pronghorn. This population reached a high of around 700 animals in 1947 (Barbee letter) when concern for the declining big sagebrush habitat important to pronghorn prompted herd reductions.

A combination of herd reductions and severe winters brought the number to around 120 animals by the mid-1960s (Houston 1982). The population stayed at this level for about 15 years, until it rose in 1983 to about 360 animals (Varley, pers. comm.). About 470 pronghorn now exist on the northern Yellowstone range (Singer, pers. comm.).

Summer range for the pronghorn is primarily at higher elevations within the park (Blacktail Plateau, Specimen Ridge, Lamar Valley), but a portion of the herd remains on its winter range year-round (Houston 1982). Availability of lush, irrigated hayland, grass and forbs makes the Church property just north of the YNP boundary attractive to the summering pronghorn. Up to 36 pronghorn have summered on the RTR-S and have used irrigated cropland there during every season (Francis, letter to Flynn). (Map 8)

Winter range for pronghorn is located on the open sagebrush-grassland foothills and flats below 5600 feet (Houston 1982). Most of the herd occupies the range north of Gardiner on the west side of the river on former ranch property added to YNP in 1932 (Singer, pers. comm.). Depending upon the severity of the winter and/or availability of forage, pronghorn may range onto RTR-S property or even through Yankee Jim Canyon north of RTR-S land (Singer, pers. comm.). During severe winters (one-year-in-ten events), migrating pronghorn have found it necessary to move into the upper Paradise Valley to find shallower snow depths (Singer, pers. comm.; Barbee, letter to Flynn). These animals must pass through Church property to reach these areas.

There has been no general hunting season (and no hunting district) for pronghorn which range to the north of the YNP boundary. In response to a request from the Church in 1985 (Francis, letter to Ellig), the DFWP authorized 15 special depredation hunting permits for pronghorn on the RTR-S for November-December 1985. This hunt was designed to discourage pronghorn from using the RTR-S by removing some and discouraging use of the area by others. This hunt succeeded in reducing the problem with a relatively small number (10-12) of animals being removed from the herd. A second request for a depredation hunt was made during October 1986, and again the DFWP responded with 50 permits for a 5-week-long hunt. This hunt was also successful in removing a small number (12-15) of pronghorn and discouraging continued use of the area by others. There has been discussion between YNP, the Church

and the DFWP to use a depredation hunt during summer months when use and damage to crops by pronghorn is greatest and during a time when only the nonmigratory segment of the herd is present on the RTR-S, but management problems associated with a summer hunt make this unlikely.

Bison

Yellowstone National Park was also a refuge for a remnant herd of bison after they were eliminated from their historic range throughout most of the western United States. From a low of fewer than 50 animals at the turn of the century, bison numbers have increased to more than 2,000 animals (Despain et al. 1986).

Bison using the northern range in YNP have been gradually shifting the focus of winter foraging farther to the north. Until recently, bison leaving the park and moving onto private property were not a significant problem, but because YNP bison carry brucellosis (which may be transmitted to domestic cattle, causing abortion), stragglers were harrassed back into the park or removed by DFWP biologists. In 1985, the increasing number of bison shifting winter ranges north of YNP boundaries prompted State legislation allowing special bison hunts outside the park. Since that time, many bison have been removed north of the YNP boundary, and many others have been frightened back into the park by hunters (88 shot by DFWP in 1985; 57 shot by hunters in 1986; and 6 shot by hunters in 1987) (Francis, pers. comm.). It is hoped that this hunt can remove enough problem animals and negatively condition other bison using property north of YNP so that the hunt will not have to be instituted annually.

Bison have not established spring-summer-fall range outside park boundaries and have consequently not become an issue on RTR-S or other private property during those seasons.

Moose

Moose are infrequently observed on the RTR-S in the upper Mol Heron Creek drainage. In areas near Church property and the YNP boundary, moose sightings are most common in the Tom Miner and Cinnabar basins. The limiting factor appears to be habitat availability, particularly an abundance of willow species (Puchlerz, pers. comm.).

Moose hunting district 314 (including the RTR-S) provided 10 antlered bull permits in 1984 and 1985. Nine were killed in 1984 and 7 were killed in 1985. All were killed in Tom Miner Basin or in drainages north of there.

Black Bear

Black bears are relatively common in the vicinity of the RTR-S, although infrequently seen. Estimates of up to 650 have been made for YNP (Cole 1976), but there have not been any recent studies attempting to arrive at an accurate number of black bears for the Yellowstone ecosystem. During 1985, there were 71 black bears reported by reliable observers within the 10 DFWP Yellowstone Ecosystem Hunting Districts (301, 310, 311, 313, 314, 316, 317, 360, 361, 362), and 63 bears were killed. There were 4,123 hunter days invested in these 63 bears, which converts to approximately 65.4 days afield

per bear killed (Swenson 1986). These numbers help reveal how infrequently bears are seen, even when seeing them is the primary goal.

Black bears are opportunistic feeders. They feed on a wide range of foods in different habitats, depending upon the availability and accessibility of a particular type of food. Upon emerging from winter dens, they will move to areas where lush vegetation occurs, such as in avalanche chutes, creek bottoms and mesic meadows and to ungulate (hoofed animals, such as deer and elk) winter-range areas where carrion may be found. As food sources dwindle at lower elevations and become available and accessible at higher elevations (as different plant species appear and develop) during summer, black bears will move to those areas. The northwest quarter of YNP and boundary areas adjacent to the park provide good habitat for both grizzlies and black bears (Mattson, pers. comm.). On the RTR-S, the upper portions of Mol Heron and Cedar creeks satisfy the habitat and forage requirements for both species of bear.

Mountain Lion

Mountain lions in the vicinity of the RTR-S are infrequently observed but are hunted as big game animals. Forty-eight lions have been taken between 1971 and 1985 along the Yellowstone River north of YNP (Koehler and Hornocker 1986).

Mountain lion habitat is typically fairly mountainous terrain near winter range for ungulate species, including deer, elk, and bighorn sheep (Logan and Erwin 1985) or near a source of domestic livestock. These criteria seem to be adequately met near the RTR-S, but there have been only occasional sightings of lions or evidence of their predation on the ranch (Francis, pers. comm.).

Other Mammals

Thompson (1982) lists 60 species of mammal which may occur in latilong 39 (including the RTR-S) (Appendix 1). This list includes 44 species documented by a specimen, 14 species which have been seen or heard, and 2 species which may occur in latilong 39.

Raptors

Twenty-seven raptorial species are listed for latilong 39 (Skarr et al. 1985) (Appendix 1). Of these, 17 are hawks, 9 are owls and 1 is a vulture. Flath (1984) lists 14 raptors as species of special concern in latilong 39 (2 of these are on the Federal threatened and endangered species list--see Threatened and Endangered Species section of this document).

Game Birds And Waterfowl

In latilong 39 Skarr (1985) lists 7 upland game bird species and 28 waterfowl species (Appendix 1). No game birds and 1 waterfowl species are listed as species of special concern (Flath 1984). Game birds found on the RTR-S include ruffed grouse, blue grouse and occasionally gray partridge. Waterfowl commonly found on the property include mallard, Canada goose, gadwall, pintail, green- and blue-winged teal, common merganser, common and

Barrow's goldeneye. During fairly recent times (no dates) trumpeter swans nested on Aldridge Lake (Puchlerz, pers. comm.).

Other Birds

Other birds listed in latilong 39 include 173 species (Skarr et al. 1985) (Appendix 1). Of these, 8 are listed by Flath (1984) as species of special concern.

Reptiles And Amphibians

Thompson (1982) lists 7 reptile and 3 amphibian species for latilong 39. Of these, no reptiles and 1 amphibian are listed as species of special concern in Montana (Flath 1984).

THREATENED AND ENDANGERED SPECIES

The following threatened or endangered (with the exception of wolf) species have been listed by the FWS as possibly occurring on or adjacent to the RTR-S property (FWS letter, 1987).

Grizzly Bear

Knight and Eberhardt (1985) included portions of the Church property adjacent to YNP in the highest density zone based on sightings and radio telemetry locations (Map 10) of grizzlies. This area also provides good spring, summer and fall forage for grizzlies (Mattson, pers. comm.). Estimating a population of grizzlies for the RTR-S and the areas immediately surrounding it would be difficult, but a general picture of possible densities can be gleaned from examination of maps of verified sightings (Basile 1982). The northwest corner of YNP and the adjacent nonpark lands include an area providing year-round habitat and high-density sightings (Figure 1). Based on knowledge of home ranges of grizzlies in the Yellowstone ecosystem it is possible that bears from a considerable distance away may use the ranch property. Knight et al. (1984) determined that adult male Yellowstone grizzlies have total home ranges (the necessary area a bear covers over a period of years in order to meet annually varying habitat conditions) averaging approximately 760 sq mi (range 290-1250 sq mi) and that adult female total home ranges averaged approximately 335 sq mi (range 140-560 sq mi). Annual home ranges were 42% (320 sq mi) of total home ranges for males and 44% (145 sq mi) for females. The information provided in Basile (1982) shows that there have been over 140 sightings of grizzlies in the northwestern corner of YNP and the adjacent private lands to the north. Knight (personal comment) indicated that it is difficult to determine which of these sightings may be bears that potentially use the property but suggested the sightings within an area of 900 sq kilometers (km) (outlined in Figure 1) around the RTR-S would be appropriate. This area had 87 sightings between 1973 and 1979.

The proposed Gallatin National Forest Plan (1986) designated the upper portion of the Mol Heron drainage as Situation I Management Area. This means that this "area contains grizzly population centers (areas key to the survival of grizzlies where seasonal or year-long grizzly activity under natural, free-ranging conditions is common) and habitat components needed

Map 10

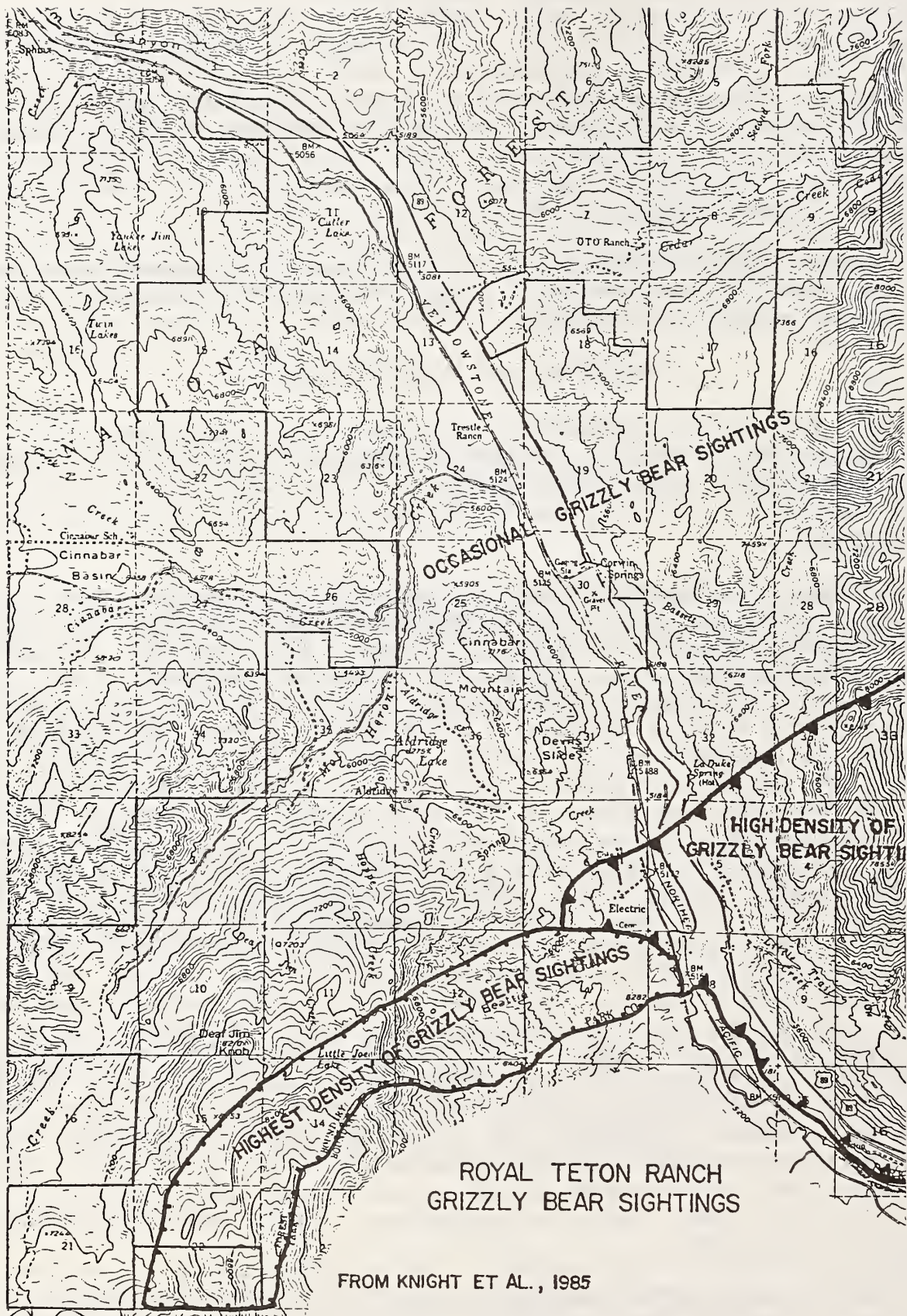
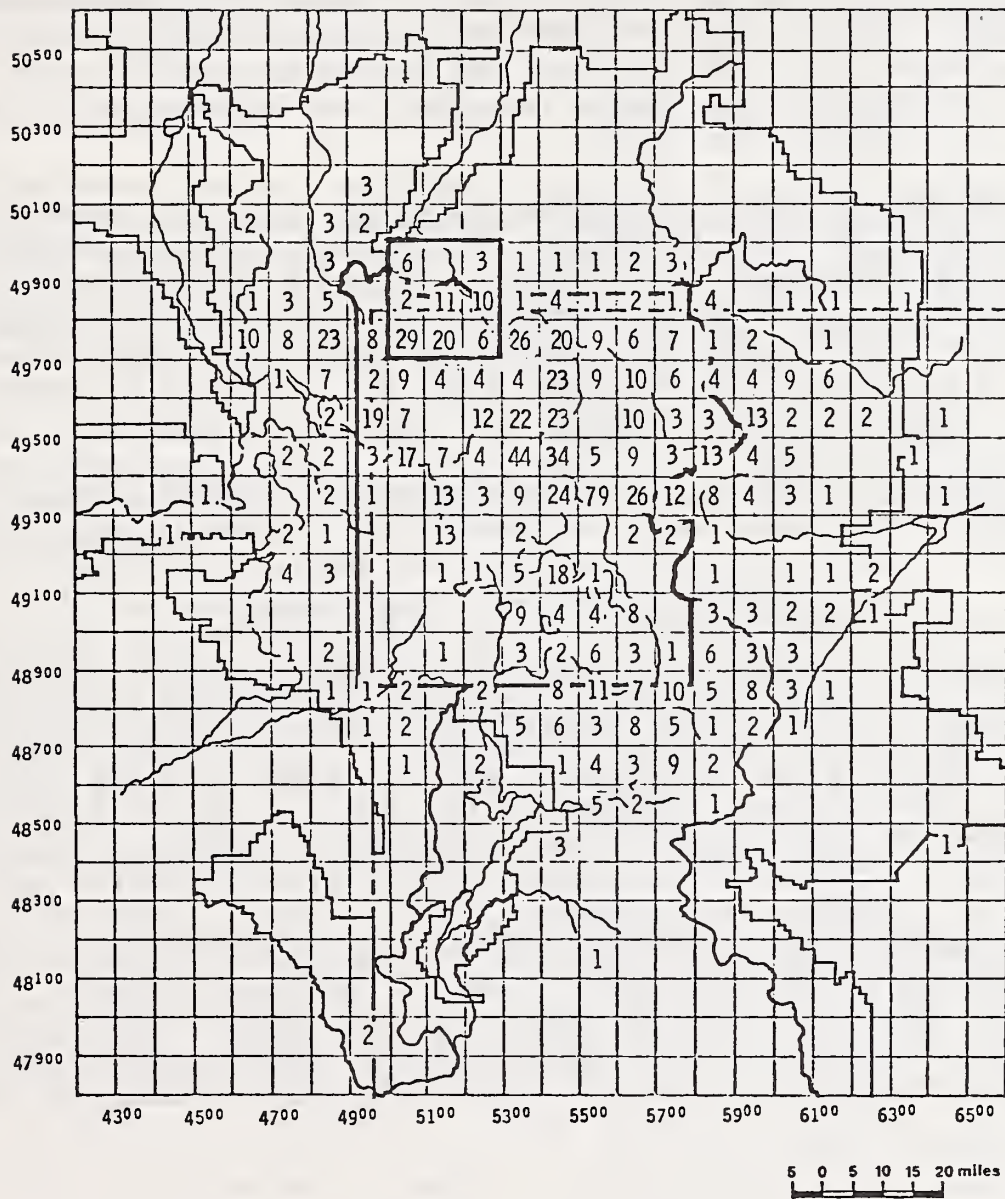


Figure 1.



Composite of verified sightings of grizzly bears for 7-year period, 1973-1979 (Basile 1982).

for the survival and recovery of the species or a segment of its populations." The remainder of the RTR-S falls into a Situation II Management Area which means that "the area lacks distinct grizzly population centers; highly suitable habitat does not generally occur, although some grizzly habitat components exist and grizzlies may be present occasionally...areas considered unnecessary for species survival and recovery..." (Proposed Gallatin National Forest Plan, 1986).

Food availability for grizzlies may vary from season to season and year to year, depending on such factors as climate and pressure on habitat by human encroachment (Sumner, pers. comm.). Drought and summer frost may reduce the availability of certain important food sources such as pine nuts, roots, tubers and forbs, and mild winters may reduce the number of ungulate carcasses. In situations such as these, bears may be forced to expand their ranges to include human-occupied areas.

It is inevitable that bears whose home ranges include developed areas such as Gardiner and Mammoth would eventually come in contact with such food sources as town dumps, orchards, gardens and perhaps livestock (Mattson, pers. comm.). In such problem situations, control methods are initiated by YNP, USFS, USFWS or MDFWP personnel. These techniques include transplanting in and outside the Yellowstone ecosystem, removal to zoos or destroying problem bears. Two bears have been trapped and transplanted from the RTR-S. In 1983, a sheep-killing bear was trapped near the Trestle Ranch and transplanted, and in 1985 a bear attracted to an RTR compost pile was trapped and transplanted. Neither bear returned to the RTR. Grizzlies have a well-developed behavioral resistance to use of developed areas, but once habituated to use of a food source near human-occupied areas, negative reinforcement (trapping, drugging and transplanting) is usually ineffective as a deterrent to continuation of the same behavior patterns, and removal becomes necessary (Mattson and Knight, pers. comm.). Behavior patterns (such as raiding dumps, gardens, orchards, etc.) can be learned from other bears (especially cubs from adults), so the problem can leapfrog and several bears can become involved and create difficult management situations (Sumner, pers. comm.).

Bald Eagles

Bald eagles are frequently observed seasonal visitors along the Yellowstone River corridor. There are no known bald eagle nest sites on or near the RTR-S, but nesting habitat seems to be available (USFS 1985). Use of the area by bald eagles is primarily during winter months (November-March) when the (usually) open water attracts fishing and waterfowl hunting eagles. Carrion and gut piles associated with ungulate winter range provide additional food sources. During aerial surveys in January between 1984 and 1987, 5 bald eagles (immature and adult) were sighted along the river corridor in the river reach from Gardiner to Point-of-Rocks. (unpublished USFS data).

Peregrine Falcons

There have been no documented sightings of nesting peregrines in the vicinity of the RTR-S, although two occupied nest sites occur within 50 miles in YNP (McEneaney, pers. comm.). There is also a Peregrine Fund

nesting site located in YNP on Slough Creek (less than 25 air miles from the RTR-S), which has successfully introduced fledglings into the Yellowstone ecosystem for 3 years (Puchlerz, pers. comm.). Observations of migrating peregrines occur infrequently in the upper Yellowstone River area (Westech 1984; Puchlerz, pers. comm.).

Wolf (Not listed by FWS due to lack of confirmed sightings.)

There have been no confirmed sightings of wolves in the Yellowstone ecosystem since resident wolves were finally removed from YNP in the 1940s after years of intensive control (Weaver 1978). Reports of "probable" sightings of 4 wolflike canids have occurred since 1968 in the Mol Heron drainage (USFS 1985), and many other unconfirmed sightings have been made since that time in the greater Yellowstone ecosystem.

There has been a great deal of discussion by Park Service researchers and DFWP personnel (Varley, pers. comm.) regarding the pros and cons of reintroduction of wolves into YNP. At this time, there are no adopted plans for reintroduction.

IMPACTS OF THE PROPOSED DEVELOPMENT

Changes and developments at the RTR-S since 1981 include: additional housing, storage facilities, office space, meat-processing plant and ranch outbuildings; agricultural development, including cultivation and planting and fencing projects (mostly repairs); harvest of 5-10 acres of pine bark beetle-damaged trees; construction of campgrounds at a conference site and construction of airstrip and hangar (Francis letter, March 25, 1987).

Prior to the purchase of the RTR-S by the Church in 1981, approximately 33 acres of land were being used in ranch development (buildings and other structures) between Gardiner and Yankee Jim Canyon, within a mile of the Yellowstone River. Recent projects and proposals by the Church suggest that approximately 85 additional acres will be used in buildings, landscaping and other structures. Seasonal use (approximately 2 weeks in late June-early July) of meadow and creek bottomland in the Mol Heron drainage (Conference Site) covers approximately 60 acres. Agricultural developments (cultivated land) on benchland and bottomland along the Yellowstone River, existing since 1981 and proposed for future development, utilize 825 acres (Francis, per. comm.).

The total of all types of development (including pre-Church ownership) and proposed development represents less than 5% of the RTR-S, and 70% of this is agriculturally developed land accessible seasonally to wildlife species.

Direct and indirect impacts may be created by development and construction. Most developments proposed and existing since 1981 represent expansions of previously existing developments. For example, with few exceptions, buildings are being built on or near areas where buildings have existed for years, and agricultural developments have renewed or expanded upon existing developments (Francis letter, March 25, 1987). Direct impacts include: loss of habitat to nonmobile wildlife species, such as small rodents and reptiles by plowing, grading, building; creation of new habitats

(crops) and possible displacement of wildlife species alarmed by increased levels of activity. Indirect impacts include: the possibility of attracting predatory species (black and grizzly bears and mountain lions) to croplands, slaughterhouse smells, composting vegetative matter and livestock; an increased incidence of road-killed wildlife; increased hunting and poaching, and introduction of disease from domestic livestock.

Direct and Indirect Impacts

Construction and development activities since 1981 (and those proposed for the future) have destroyed some habitat for a small number of nonmobile species (those which aren't displaced to adjacent habitats). This loss should not be significant to the local populations of nonmobile species.

Most wildlife species could potentially suffer impacts from increased hunting, poaching and road-kill, but the Church exercises some control of firearms and hunting by ranch residents. Patrolling the ranch has drastically reduced poaching. Carpooling is expected to limit vehicle use to present or slightly higher levels.

Some long-term displacement to most wildlife species may occur as a result of the new homes in the Mol Heron drainage near the Conference Site and the associated travel to and from them.

Impacts associated with the existing and proposed developments to elk, mule deer, white-tailed deer, pronghorn and bison will likely be minimal and may include short-term displacement during construction activities. Most of these species use the areas near the developments only during winter months when construction activities will be slowed or curtailed and where ranch activity and development has taken place for many years. Approximately 40 acres of spring habitat for elk and mule deer in the Mol Heron drainage have been altered at the Conference Site. This may cause displacement of animals using this habitat.

Those species using RTR-S agricultural property during summer months (primarily pronghorn) may find increased forage availability. This may be an attractant which could necessitate control measures, including depredation hunts.

The jack-leg fence being constructed on the YNP/RTR boundary is designed to contain RTR livestock and will have openings to allow wildlife to pass through during winter migrations. This fence should pose no threat or obstacle to any wildlife movement. There are no wildlife-proof fences on the RTR-S with the exception of the fence around the 30 acre tree farm at the Ranch Headquarters, and none are proposed for future developments.

Bighorn sheep using winter range on Cinnabar Mountain have been in contact with ranch activities and development since they became established during the mid-1960s. Increased activity during recent years does not appear to have altered their use of the area. There has been speculation that contact with domestic sheep could lead to infection of the bighorn herd with the bacterium Pasteurella hemolytica, which can cause severe bronchopneumonia. The disease results in the death of infected animals and large portions of the herd, because it is highly contagious. There are no record-

ed incidents of this occurring in wild sheep herds during the many years large bands of domestic sheep intermingled with them on seasonal range in the upper Yellowstone country. However, there is concern by many biologists that the possibility of an epizootic (affecting many animals of the same type simultaneously) is great when coupled with other stress factors (lung-worm, forage competition, human disturbance, adverse weather) and that the best defense against this is total insulation of bighorns from contact with domestic sheep (Kistner letter, March 30, 1987; Davis et al., no date; Irby, pers. comm.).

There are not expected to be any impacts from RTR-S developments on moose populations, due to the limited number of moose using the ranch and the fact that they, and their limited habitats, exist in the upper reaches of Mol Heron and Cedar creeks where no developments are proposed.

Black bears are not expected to be affected directly by proposed developments on the ranch. There has been construction activity in the Mol Heron drainage, which has eliminated approximately 40 acres of potential spring foraging habitat, and there may be displacement of bears at this Conference Site in early July for a 2-week period.

Increased human populations could potentially increase hunting and poaching activities, but control of hunting and use of firearms on the ranch is expected to limit these activities to no greater than present levels.

The fruit trees, root crops, irrigated hay and grain, compost piles, slaughterhouse smells and food smells at the Conference Site could potentially attract bears and cause confrontations with humans. These situations might then require some type of management action, including relocation or removal from the population.

Mountain lions, coyotes, bobcats and other mammals will probably not feel the effects of development on the RTR-S. Few lions are seen on the property and hunting for lions (a big game animal) will not increase because of an increased human population on the RTR-S (Francis, pers. comm.). Coyotes and bobcats have developed a human avoidance behavior which should not change with an increase of human activity. Increased hunting and trapping should not affect overall population of these animals in the greater Yellowstone ecosystem. Other mammals such as skunks, porcupines, marmots and ground squirrels may suffer impacts from increased hunting in areas near agricultural developments and dwellings, but these impacts should not affect the overall populations in the area.

There should be little or no impact on raptors due to development on the RTR-S. No known nesting raptors will be disturbed during any development activities. Potential prey species may increase in the areas of agricultural improvement, which would benefit raptors.

There should be no negative impacts to game birds and waterfowl associated with development on the RTR-S. Agricultural improvement may increase the availability of food for partridge and waterfowl. Hunting of waterfowl by ranch residents is not anticipated. Direct impacts to other birds, reptiles and amphibians are expected to be minimal. Some habitat will be destroyed and some animals may be killed during development activities, but

these impacts should not affect the overall populations in the area. Increased forage opportunities from agricultural improvements may offset the losses.

Threatened And Endangered Species

Grizzly Bear

Direct impacts to grizzly bears are expected to be minimal. Development of the Conference Site in Mol Heron Creek (near the division between Situation I and Situation II grizzly management areas) has removed approximately 60 acres of potential spring-summer habitat, but this would probably not have a significant effect on local grizzly populations. There may be displacement of grizzlies associated with the annual gathering at the Conference Site in late June-early July for a 2 week period. This displacement and the potential for human/bear conflicts by recreating conferees may represent a significant impact if the need for bear management actions arises.

Although the human population on the RTR-S will be increasing significantly from pre-1981 levels, hunting pressure on black bears will probably not increase (Francis, pers. comm.). Therefore, danger of mistaking a grizzly bear for a black bear by a hunter on the Church's property is not likely to be significantly higher than pre-1981.

A major impact to the grizzly population may be the management action (relocation or removal) associated with human contact because of the attraction to food sources, such as root crops, fruit trees, composted vegetation, irrigated cropland and the slaughterhouse on the RTR-S (pers. comm. with Knight, Mattson, Foss, Puchlerz, Sumner, Varley). The likelihood of this is greater if the climate creates a poor forage situation in the back country. To date there have been no management actions necessary because of these attractants on the RTR-S, but 5 bears were removed in an incident in 1982 because of potential conflicts between humans and bears attracted to the fruit orchard of a rancher with inholdings on the RTR-S (Puchlerz, pers. comm.). There has been 1 relocation from the ranch because of a bear/sheep conflict near the Trestle Ranch. One grizzly attracted to composed vegetation was also transplanted. These actions were successful in that the bears did not return and were not removed from the population (Puchlerz, pers. comm.).

Bald Eagle

Direct impacts to bald eagles are expected to be minimal. There is a potential for collision with aircraft landing on the RTR-S airstrip, which is within a half mile of the Yellowstone River. However, because use of the airstrip will be minimal during the time eagles use the river corridor (winter months) this is an unlikely possibility. The airstrip is used only for light private aircraft and only 1 airplane is presently based there.

There are not expected to be any impacts associated with food sources of eagles as a result of development on the Church's property.

Peregrine Falcon

There is very little possibility that there will be any impacts at all on peregrine falcons. There have been very few sightings, and there are no known nests in the area (Puchlerz, pers. comm.).

Gray Wolf

Because of the infrequency and unreliability of wolf sightings in the vicinity of the RTR-S in recent times, there is little possibility that there will be impacts to wolves from developments. There is, however, a strong possibility that introduction of wolves to YNP could cause conflicts with livestock (particularly sheep) and create management difficulties (Foss, pers. comm.).

MITIGATING MEASURES

To minimize the impacts associated with development proposed for the RTR-S, the Church has agreed to some mitigative measures and is considering others. Among those mitigative measures agreed to are:

- The slaughterhouse includes a septic system to dispose of blood and water with a fat separator and a sealed storage area inside the building for solid waste. The fat will be collected with solid waste (including entrails, feathers, bones, trim, etc.) and will be hauled away at the conclusion of processing to a public disposal area in Livingston. Processed meat will be stored in sealed freezers. Actual slaughtering will occur less than 30 days during the year, and kills will be performed inside.
- Traffic problems which may increase road-kills will be controlled by car-pooling. Traffic levels will be maintained at present or slightly higher levels.
- Hunting is closely regulated and poaching by RTR-S residents is controlled indirectly through communal living. Patrolling the ranch has nearly eliminated poaching by nonranch residents.
- Domestic sheep are not allowed to use the winter range of the bighorn herd on Cinnabar Mountain and are kept in a fenced area more than one-half mile from the winter range. A proposed land exchange with FS would formalize this arrangement by restricting domestic sheep from Cinnabar Mountain with a binding easement or covenants.
- The jack-leg fence erected along the RTR-S/YNP boundary has been designed with areas opening to allow movement of migrating ungulates.
- The tree farm area (with fruit trees) has been fenced with ungulate-proof fence which could easily be bear-proofed.
- A dust suppression plan on RTR-S roads (including the county road) has been developed to control dust which may affect the vegetation (or its palatability) on bighorn winter range.

- A pamphlet and program have been developed by the Church to educate members and conference visitors about the sensitivities of various wildlife species, especially grizzly bears, and the potential threats posed to them by various activities.
- Food for conferees at the Mol Heron site will be prepared at The Ranch Kitchen on the east side of the Yellowstone River and at the staff kitchen and dining hall located in the Ranch Headquarters development, which is inside the tree farm fence. Garbage at the site is bagged, stored in covered cans and hauled out to the Livingston incinerator periodically and at the end of each day.

Mitigative measures which may be considered are:

- A bear-proof electric fence should be built around the root crop fields.
- Composted vegetation and compost pile should be moved to other Church property off the RTR-S where bear problems do not exist and there is little likelihood of them developing.
- Wildlife habitat improvement projects on bighorn winter range may be initiated.
- The domestic sheep herd may be moved off the RTR-S to insulate the Cinnabar Mountain bighorn herd from the potential of disease transmission.

FISH

FISHERIES/AQUATIC INSECTS

Portions of the Yellowstone River, Mol Heron Creek and Cedar Creek flow through the RTR-S. In addition to these watercourses, the ranch may influence the fishery in Reese Creek, located in Yellowstone National Park, through exercise of water rights.

Fisheries

Yellowstone River

Brown trout (Salmo trutta) dominate the trout population in the Corwin Springs reach of the Yellowstone. They are followed in abundance by rainbow (Salmo gairdneri) and Yellowstone cutthroat (Salmo clarki bouvieri). Clancy (1982) estimates that approximately 1,000 catchable trout per mile inhabit this section of the Yellowstone. In comparison the same author estimates approximately 3,000 catchable trout per mile in the Yellowstone at Livingston.

Other fish species found in this reach include rainbow-cutthroat hybrids, mountain whitefish (Prosopium williamsoni), longnose dace (Rhinichthys cataractae), longnose sucker (Catostomus catostomus), white sucker (Catostomus commersoni), mountain sucker (Catostomus platyrhynchus) and mottled sculpin (Cottus bairdi).

The Yellowstone cutthroat trout is a DFWP Class A fish of special concern. There are limited Yellowstone cutthroat numbers and/or limited habitats both in Montana and North America, and elimination of this fish from Montana would be a significant loss to the gene pool of the subspecies (DFWP 1986).

The Yellowstone cutthroat evolved in the Snake River drainage where it was geographically isolated from rainbow trout. It is believed that the Yellowstone cutthroat invaded the Yellowstone drainage from Pacific Creek of the Snake River, over Two Ocean Pass, to Atlantic Creek of the Yellowstone drainage. This subspecies was native to most of the Yellowstone River and tributaries extending as far downstream as the Tongue River (Behnke 1987). During the past 100 years, stocking of rainbow into almost all areas of the Yellowstone and other drainages has destroyed the isolation that had protected the native cutthroat from hybridization with rainbow for thousands of years. Hybridization and replacement through competition by rainbow, brook, brown and lake trout has resulted in the present survival of pure Yellowstone cutthroat populations in only a tiny fraction of their native range (Behnke 1987). Hadley (1984) in a status report on the Yellowstone cutthroat trout in Montana concluded that pure strain Yellowstone cutthroat currently exist in only 8% of their original range in Montana.

In addition to hybridization and replacement, cutthroat trout are susceptible to over-harvest by fishermen. Vincent and Clancy (1980) found that the catch rate in the Corwin Springs area in 1978 and 1979 was 0.49 cutthroat per hour. This compares to a brown trout harvest of 0.58 fish per hour even though the brown trout population is about 3 times larger than the cutthroat population in this reach. In an attempt to reduce the mortality of cutthroat from fishing pressure, the DFWP implemented new regulations on the upper Yellowstone River in 1984 which allow no cutthroat in the creel. Clancy (pers. comm.) reports that after 2 years, results are encouraging. In the upper Yellowstone, cutthroat populations are at essentially the same levels as in 1984. Downstream near Livingston, where cutthroat are still allowed as part of the creel catch, populations are about half of the 1984 level.

Yellowstone cutthroat trout spawn principally in tributary streams. Berg (1975) studied the spring spawning migrations of cutthroat from the Yellowstone River and DFWP has undertaken this work annually since 1983. Oswald (1982) collected data for migratory spawning cutthroat in Bear Creek near Gardiner. The FWS (Mahoney, Draft Report 1987; Lentson 1986) collected similar, although less detailed, information for Reese Creek during the springs of 1984-86. The nature of these data collection efforts makes it impossible to determine quantitatively the importance of each of these streams to the cutthroat spawning run, however, it appears that streams in the upper Yellowstone (Tom Miner, Cedar and Mol Heron) are especially important spawning areas. Most of the tributaries downstream in the Paradise Valley are dewatered shortly after the June runoff, thus it is not possible for cutthroat to enter these streams to spawn. In cases where they do enter the streams, water is not adequate to provide for incubation of the eggs or rearing of the fry, which are believed to move into the main stem river in the fall (Clancy, pers. comm.). This makes the integrity of the runs in these upper Yellowstone tributaries take on greater importance.

Rainbow and brown trout provide excellent angling opportunities. Although not native to the area, they now provide the bulk of the trout fishery and harvest. The Yellowstone cutthroat is a highly prized native species, but it is by far the least numerous of the 3 trout species present today (Berg 1975). Berg undertook limited investigations of the spawning migrations of rainbow and brown trout as well as cutthroat. He concluded that brown and rainbow selected only spring creek tributaries for spawning and were not found in any mountain stream. Further investigation by Clancy (pers. comm.) has shown that while rainbow spawn predominately in the spring creeks, the brown trout spawn principally in the main stem Yellowstone. Since flows in the main stem and the spring creeks are not severely depleted during the fall and spring spawning seasons (as are the mountain tributaries), the rainbow and brown trout populations do not need to overcome the problems faced by the cutthroat in their spawning migrations.

Clancy (pers. comm.) reports that an unknown percentage of the brown trout from the Mol Heron area of the main stem Yellowstone run into the Gardiner River to spawn. Most of the remaining browns spawn in the main stem.

Proposed developments could potentially affect the Yellowstone River through the introduction of sediment during construction, changes in water quality from waste water discharges and habitat degradation. The potential sources of waste water discharge include: the Ranch Office area and proposed public waste water system for the food processing facility (1,000 ft from Yellowstone River); the Spring Creek Church Headquarters site with proposed public waste water system and nondischarging lagoon (925 ft from Yellowstone River) and the Ranch Headquarters proposed new waste water system (1,070 ft from Yellowstone River). (See Water Quality, Quantity and Distribution for more information on how the proposed developments will affect water quality.)

Mol Heron Creek

The headwaters of Mol Heron Creek are near the northern boundary of Yellowstone National Park. The creek flows in a northeasterly direction for about 9 miles to its confluence with the Yellowstone River. For most of its length Mol Heron flows through alternately steep narrow canyon sections and open meadows. The one-half mile from its mouth to where it enters the first canyon is agricultural land. On the left (downstream) bank is a sheep holding-pen and an irrigated small grain field. Approximately 98 ft south of the right bank (downstream bank) is a gravel crushing/washing operation with associated concrete batch plant and a tree farm. The riparian zone is in very good condition except in the area of the sheep holding-pen where there is an approximately 190-foot section that is devoid of riparian vegetation.

Since purchasing the ranch, the Church has made several improvements and conducted activities in proximity to the Mol Heron drainage. These include the construction of 4 homes (600 ft from the stream), the development of a campground with shower and toilet facilities (400 ft from the stream), the siting of its new ranch headquarters facility (1,100 ft from the stream), and the creation of an outdoor meeting area.

The 4 homes are served by 3 septic tank/drainfield sewage systems that were permitted by Park County in 1983 and 1986. Similarly the septic tank-/drainfield system that treats wastes from the shower houses/flush toilets in the campground was permitted by the county in 1982 to be used for less than 60 days per year. Portable toilets are furnished at the outdoor meeting area when it is being used. These are pumped and the wastes trucked to the Gardiner sewage treatment plant for disposal.

In addition to the developments that have already occurred, several more are proposed. The Church plans to develop a well at the outdoor meeting site. Water supplied by the well will be used for handwashing and personal hygiene. The resulting grey water will be discharged to a holding tank which will be pumped as necessary. The grey water will then be trucked to the Gardiner sewage treatment plant for disposal.

The Church currently has a permitted sewage treatment system at the tree farm/Ranch Headquarters site. This system will not be adequate to treat all of the wastes from the proposed additional development. Therefore it is seeking to install additional treatment facilities at this site.

Fish species present in Mol Heron Creek include Yellowstone cutthroat, rainbow, rainbow-cutthroat hybrid, brown trout, mountain whitefish, mottled sculpin and longnose sucker. Abundance of game fish in the creek is described as excellent (DFWP, pers. comm.). The stream has been given a class value of 1 by DFWP. A class 1 stream is defined as an outstanding fisheries resource. In the case of Mol Heron this is due to the presence of habitat for Yellowstone cutthroat. As noted above, Mol Heron is one of the streams in the upper Yellowstone believed to provide important spawning habitat for migratory spawning Yellowstone cutthroat. Although the stream has been dewatered historically (Dodson 1985) through irrigation, this is not the current practice.

Cedar Creek

Cedar Creek flows generally west, approximately 4 miles from its headwaters to its confluence with the Yellowstone River. For the first half mile upstream from the mouth, the streamside land use is subdivision and cattle grazing. Riparian vegetation is limited in the portion of this reach downstream of the highway. Above the highway the stream flows through a narrow canyon for approximately 1 mile where the canyon opens to a wide meadow. This meadow is the area where the OTO Ranch headquarters (part of the RTR-S) is located.

Fish species found in Cedar Creek include Yellowstone cutthroat, rainbow, brook, brown and rainbow-cutthroat trout, mountain whitefish and mottled sculpin. Yellowstone cutthroat are considered abundant in the stream, all other game fish are uncommon or rare (DFWP 1986). As noted above, Cedar Creek is considered an important Yellowstone cutthroat spawning stream.

Cedar Creek has been given a value class of 1 for the same reasons as described for Mol Heron Creek.

Reese Creek

Reese Creek is located just within the northern boundary of Yellowstone National Park. The stream originates above Cache Lake at an elevation of approximately 8,200 feet and flows about 7 miles in a northeasterly direction to its confluence with the Yellowstone River. A series of 3 irrigation diversions are located at approximately 0.5, 0.9 and 1.2 miles above the confluence. In many years the stream is totally dewatered below the last diversion from mid- to late July until the end of the irrigation season. Below the diversions the stream flows through open sagebrush benchland. Poor riparian vegetation in this area is indicative of heavy wildlife grazing. Above the diversion, the stream flows through a V-shaped valley containing a forested riparian zone. Several small meadows are interspersed throughout the wooded riparian corridor (Mahoney, Draft Report 1987).

The FWS feels that due to dewatering, there are no resident fish populations downstream from the irrigation diversions. Electroshocking studies conducted below the diversions from May through July have resulted in catches of cutthroat, rainbow, cutthroat-rainbow, brook and brown trout as well as mottled sculpin. The mottled sculpin is a spring spawner, as are the rainbow and cutthroat. Brook trout and brown trout are fall spawners, thus the presence of adult brook trout in the stream in the spring is interesting. The captured brown trout were young-of-the-year fish, which intimates that brown trout use the creek for spawning (Lentsch 1986). Above the diversions, the only fish species found during electroshocking studies were Yellowstone cutthroat.

Prior to irrigation in the Yellowstone Valley, the FWS believes Reese Creek supported a substantial spawning run of Yellowstone cutthroat (Lentsch 1986), although no evidence to support this belief exists. Yellowstone cutthroat return to their natal streams to spawn (Berg 1975), thus the presence of adult fish returning to this stream to spawn indicates that despite the frequent dewatering, the stream is producing some recruitment to the main stem.

The NPS would like to see an instream flow maintained in the stream below the diversion structures to enhance the existing spawning run. The Park Service and Church are currently negotiating a possible water rights agreement for Reese Creek, but the Montana Water Court has not yet adjudicated competing claims to water rights for this drainage basin.

Aquatic Macroinvertebrates

Yellowstone River

Information regarding the aquatic insect species found in the Yellowstone River at Corwin Springs was obtained from Thurston et al. (1975), Newell (1977) and DFWP (unpublished). The various authors collected aquatic macroinvertebrates from the river at Corwin Springs during summer and fall, utilizing a Waters' round-type sampler. Thurston et al. collected 1 sample per station per sampling episode while Newell made 6 collections per station. DFWP made 4 collections per station. Newell's and DFWP's samples were collected from randomly selected locations in a riffle at each station. Thurston's sampling locations were apparently selected according to water

depth and velocity criteria. Due to the sampling schemes chosen by the authors, it is likely the Newell and MDFWP data present a better picture of actual macroinvertebrate community composition.

Newell found the macroinvertebrate fauna of the Yellowstone River to be rich in numbers and species. The number of species and the total population numbers are highest in the upper reach of the river (Corwin Springs) and decrease downstream. At Corwin Springs he found that the macroinvertebrate community was dominated by Trichoptera (caddisflies) 62.4%, Diptera (true flies) 21.1% and Ephemeroptera (mayflies) 14.5%. The Plecoptera (stoneflies) were not abundant (1.4%) but were represented by several different species. The MDFWP collections were identified to family and are compared to Newell's data in Table 1.

Table 1. Aquatic insect community composition of the Yellowstone River at Corwin Springs, Newell and MDFWP data.

Family	1975		1984		1985	
	Avg. No./m ² (% of Total)		Avg. No./m ² (% of Total)		Avg. No./m ² (% of Total)	
Plecoptera	92	(1.4)	123	(4.0)	115	(4.3)
Trichoptera	4,170	(62.4)	1,586	(50.6)	1,392	(51.6)
Ephemeroptera	973	(14.5)	810	(26.0)	704	(26.1)
Chironomidae	1370	(20.5)	484	(15.4)	464	(17.2)
Other Diptera	38	(0.6)	80	(2.5)	6	(0.2)
Other	43	(0.6)	49	(1.5)	17	(0.6)
Total	6,686 (100.0)		3,132 (100.0)		2,698 (100.0)	

Newell and Thurston et al. calculated the diversity index of the aquatic macroinvertebrate community at Corwin Springs. It is generally accepted that a diverse community (one with many species) is indicative of a healthy environment. Environmental stress usually results in a reduction in the number of species in the community. The diversity index is calculated to determine the diversity of a particular community. Generally an index above 3.0 indicates a healthy, unstressed community, while an index below 1.0 is typical of a community under stress (Newell 1977). Both Newell and Thurston et al. calculated diversity indices of 2.6 for the Yellowstone at Corwin Springs. Based on these statistics and the species making up the insect communities it is evident that the Yellowstone River in this reach supports a diverse and healthy aquatic insect community subject to relatively minor stresses. Likely sources of this stress may include discharges from the sewage treatment facility at Gardiner, which also includes sewage flows from the development at Mammoth.

Mol Heron and Cedar Creeks

There is no available aquatic insect information for Mol Heron or Cedar creeks.

Reese Creek

FWS took aquatic insect collections from Reese Creek during July 1986. One sample per study reach was taken using a Surber square-foot sampler. Due to the 1-season, 1-sample-per-reach study design, these data are of limited value. Six study sections were established. Study Reach 1 extended from the mouth of Reese Creek to the most upstream of the irrigation diversions. This is the reach of most interest to this study since this is the area where cutthroat spawning has been observed and is also the reach that the Royal Teton Ranch can affect through water withdrawals.

Based upon the single sample collected, mayflies dominated the community in Reach 1 (Appendix 2). Three species of mayfly (Baetis bicaudatus, Drunella coloradensis and Cinygmula sp.) and a single species of true fly were identified. In general the upstream stations contained a greater number of species and total numbers per square foot. At the upstream stations the dominant orders were the Ephemeroptera and Trichoptera. In general it would appear that the stream (especially Reach 1) is somewhat reduced in numbers of species. This may be an artifact of the study design.

The Ephemeroptera and Trichoptera are generally regarded as indicators of high-quality waters. Mahoney (Draft Report 1987) states, "The collection of numerous environmentally sensitive macroinvertebrates in...four reaches indicates very high-quality habitat and healthy environmental conditions. The low species diversity and Biotic Condition Index in Reach 1 indicate a poor to fair habitat quality." The habitat condition in Reach 1 is attributed to dewatering as discussed.

IMPACTS OF PROPOSED PROJECT AND RECOMMENDED MITIGATION

Impacts to aquatic insects and fish could result from introduction of sediment during construction, changes in water quality caused by discharges from the proposed sewage treatment facilities and habitat degradation from proposed land uses. This section describes the possible affects of the proposed activities and recommends appropriate mitigative measures to minimize these impacts.

Aquatic Macroinvertebrates

Yellowstone River

Construction activities will take place at the Spring Creek Headquarters site, the proposed lagoon site, East Gate work camp and the tree farm/Ranch Headquarters. It is unlikely that water-borne sediment from these construction sites would reach the Yellowstone River, due to their distance from the river and the presence of sediment-trapping vegetation between the river and the construction sites. The exception is the East Gate work camp area where construction will take place in close proximity to the river.

Revegetation of the construction sites will occur at each of these sites. Revegetation should immediately follow the completion of construction. At the East Gate site, hay bales will be placed around the construction site to retain any sediment generated during storm events that may

occur during and following the construction phase. These bales will remain in place until revegetation efforts following construction are successful. (See Sediment Loading From Developed Areas, P. 55.)

As described in the section on water quality, any changes that may occur in Yellowstone River water quality as a result of sewage discharges from the Ranch Office, Spring Creek Headquarters or Ranch Headquarters will be negligible and will not affect the periphyton standing crop in the river. It follows, therefore, that there will not be any changes in the aquatic insect community of the river due to changes in water quality.

With the exception of the proposed construction, there are no foreseeable changes in land use on the ranch property. The Church intends to continue to run a ranch/farm operation as it has since occupying the ranch in 1981. The principal changes in operation will involve a gradual change from flood to sprinkler irrigation, which has already begun.

Overall, no changes in the aquatic insect community or productivity are expected.

Reese Creek

There will be no construction activities in the vicinity of Reese Creek nor does the potential exist for sewage, treated or otherwise, to enter the stream. Changes in land use, specifically changes in the manner and amounts of water diverted from the stream for irrigation purposes could affect the aquatic insects of the creek.

The Church and YNP are currently negotiating a possible agreement to provide water for both irrigation and instream uses. If the negotiation is successful it could result in an improvement in the aquatic insect habitat and community.

Mol Heron Creek

The proposed new construction activities at the tree farm/Ranch Headquarters and at the outdoor meeting area could lead to the introduction of sediments to Mol Heron Creek. Hay bales will be required to contain sediment within the construction areas as described for the East Gate site. Revegetation and reclamation of the sites should immediately follow construction. These steps will effectively preclude the introduction of sediments to the stream. (See Sediment Loading From Developed Areas, P. 55).

It is extremely difficult to assess the changes, if any, in water quality in Mol Heron that may occur from the sewage treatment systems associated with the shower house/toilets and the 4 houses built in the drainage. The drainfield for the shower house system is located approximately 400 feet from the stream and is separated from the creek by the road. This system is used for less than 60 days per year. The drainfields associated with the treatment systems for the 4 houses are also located a considerable distance from the stream (approximately 600 ft). These distances are well in excess of the minimum required by state law.

As previously mentioned, Mol Heron has been dewatered historically.

Many of the lands that were irrigated from Mol Heron are now irrigated using other sources or are irrigated using more efficient methods. As a result, flows are maintained in the stream year-round. This is expected to continue in the future. Consequently, the aquatic insect community is expected to maintain its current composition and productivity.

While the extent of potential impacts cannot be quantified, in this drainage it is unlikely that changes in the aquatic insect community will occur.

Cedar Creek

There are no developments or changes in land use anticipated in the area of Cedar Creek; consequently, no changes in the aquatic insect community are expected.

Fisheries

Yellowstone River

If the mitigation measures outlined above are incorporated, and given that there are no expected changes in the periphyton or aquatic insect community or changes in land use, then no changes are expected in the fishery of the Yellowstone River.

Reese Creek

If a water rights agreement is negotiated that provides for instream flows in Reese Creek, it is possible that this stream will become more important as a Yellowstone cutthroat nursery. Otherwise, no new adverse impact to this stream or its fishery is anticipated from the proposed developments.

Mol Heron Creek

The principal impact to the fishery of Mol Heron Creek could come from the over-exploitation of the resident and migratory fish. The Church has developed fishing regulations for people attending its outdoor conference in early July. These regulations are more stringent than those promulgated by the DFWP. Even though the outdoor conference lasts only 1-2 weeks, the 1,000-2,000 participants could seriously affect the fishery of this small stream through fishing pressure. This is especially important since this is the same time period when the migratory Yellowstone cutthroat are spawning. A catch and release program would be more beneficial to the stream if implemented during the Yellowstone cutthroat spawning season.

The changes in the fishery that may occur as a result of developments in the drainage to date are very difficult to describe, as noted above, for aquatic insects.

The maintenance of water in the stream channel has in all probability enhanced the fishery and nursery value of Mol Heron Creek. The current water and land uses are not expected to change substantially, thus the fishery should not either.

Cedar Creek

No changes in the fishery of Cedar Creek are anticipated as no activities are planned for this drainage.

DFWP COMMENTS

The OEA reports were reviewed by DFWP personnel in the department's Bozeman and Helena offices. The DFWP comments include:

WILDLIFE

The general description of the existing environment and associated wildlife species was adequate and reasonably well supported by existing information sources.

The primary comment we have on the entire section relating to the various involved wildlife species is that too much emphasis was placed on impacts or influences of activities totally unrelated to the proposed development--for example hunting seasons, antler gathering and various forms of outdoor recreation. This situation was particularly pronounced under the section dealing with elk....

Some specific comments on particular sections of the document follow:

Elk

Elk hunting, antler gathering and other recreational activity can displace elk from portions of the existing winter range. Such activities are of a seasonal nature, and can be curtailed or adjusted by regulation in the event they cause significant problems to the elk resource. Hunter harvest of elk is utilized as a means of regulating numbers with capacity of existing habitat. Although this activity does influence elk behavior during the time seasons are in effect, it should not be compared to the impacts of permanent development and the habitat loss that is associated with such impacts.

Mule Deer

The discussion of mule deer populations as they relate to forage condition and livestock competition is not relevant in this situation. The spring population figures for mule deer, comparing 1986 and 1987, are more likely a reflection of weather conditions with the higher count in 1987 indicating higher fawn survival in 1987, than they are of range conditions or competition. Population changes associated with range conditions are more likely to be slow trends, rather than abrupt annual fluctuations.

Bighorn Sheep

The quality of the winter range has not necessarily deterio-

rated, but the quantity of winter forage available to bighorn sheep has decreased as the result of competition with elk.

Bison

As the bison population continues to increase within the park, annual hunting outside the park is also likely to be a more common event. The presence of the control actions initiated by the DFWP has reduced the opportunity for bison to establish seasonal ranges outside the Park boundary.

Impacts of the Proposed Development

No one development will necessarily have significant impacts on wildlife populations and their habitats. As development increases, with associated increases in the human populations, the cumulative results will add to a significant impact. This has been evidenced up and down the Yellowstone Canyon in the past several decades. Each added development further reduces the quantity and quality of habitat for the involved wildlife species.

It is very probable that as agricultural activities intensify, the tolerance that the involved landowners have for wildlife will decrease. The magnitude to which this actually takes place cannot be determined until after the fact. It has the potential to be one additional impact to consider.

Mitigating Measures

Most of the proposed measures, if carried out as indicated, will reduce impacts associated with involved actions. Efforts to reduce attractants to bear, such as the appropriate processing of slaughterhouse wastes, and electric fencing of root crops will do a great deal to minimize depredation problems that could be associated with these activities.

The removal of domestic sheep from areas utilized by bighorn sheep would be a desirable action.

FISHERIES

Mol Heron Creek

The DFWP is unaware of special fishing regulations for Mol Heron Creek on RTR-S lands.

The septic system [for the] shower and toilet facility on Mol Heron Creek could conceivably have an adverse impact on the creek through organic enrichment. In view of the short season of use, options for transporting the wastewater to the treatment plant in Livingston may be worth exploring. Protection of Mol Heron Creek is particularly important in view of the fact that it is one of the few spawning tributaries for Yellowstone cutthroat trout in the upper Yellowstone drainage.

Mol Heron and Cedar Creeks

The Church has filed for irrigation water rights that, taken together would totally dewater these streams during the summer irrigation season. In the case of Mol Heron Creek, separate year-round claims were also submitted for power generation, industry and mining. Based on the number and purpose of these claims, it appears that large scale developments that could severely impact the fisheries of these two streams are being considered. As long as the Church continues to pursue these claims in the water adjudication process, the department can only assume that such developments are possible in the future. Water claims were also submitted for many of the tributaries to Mol Heron Creek. If these claimed rights are developed in the future, the flow of Mol Heron Creek would be impacted even further.

For the reasons stated above, the DFWP does not believe that the statements, "no activities are planned for these drainages" is an accurate representation of the available facts.

VEGETATION COVER, QUANTITY AND QUALITY

The vegetation study area includes the approximately 12,000 acres west of the Yellowstone River adjacent to YNP and approximately 3,300 acres on the east side of the river (the former OTO Ranch). Together these properties are collectively referred to as RTR-S. The native vegetation of the area reflects the influence of a strong continental climate which is characterized by hot, dry summers, cold winters, low humidity and wide yearly fluctuations in precipitation and temperature (Wernstedt 1960; Mueggler and Stewart 1980). However, the rugged topography and extreme relief of the Gallatin Range greatly modifies effective precipitation and temperature which produces a complex and diverse vegetation pattern.

Successional stages within and between community types vary widely. This is due in part to fire and fire-suppression histories of the area (Taylor 1974; Houston 1973). Wildlife and livestock grazing undoubtedly have also played a role in community-type distribution and species composition.

No threatened, endangered or proposed threatened and endangered species, as currently listed with the U.S. Fish and Wildlife Service, are located in Montana (Harms 1987). The Montana Natural Heritage Program lists the occurrence of 366 species of special concern in Montana (Shelley 1987). Of these, 110 species occur in the floristically diverse southwest region of the state, which includes Park County (Lesica et al. 1984). Due to habitat requirements none of these are likely to occur on the RTR-S.

Discussion of the occurrence and distribution of community types is based on vegetation mapping done by the USFS. The classification system used was developed to identify grizzly bear habitat components (Matson and Despain 1985). The system uses both cover-type and climax vegetation habitat-type methods (Pfister et al. 1977; Mueggler and Stewart 1980). For the purposes of this general review, 8 native vegetation groups and 4 other

groups were compiled from the habitat-type components of this mapping (Map 11). (Appendix 3).

Because of the diverse nature of the developments on the RTR-S, impacts to the vegetation will be discussed from the perspective of the type of proposed development.

URBANIZATION

Approximately 120 acres have been or are proposed to be developed in the Corwin Springs area. These developments include remodeling of existing buildings and construction of office, Church and school buildings, homes and other structures. Associated developments include construction of roadways and landscaping.

About 60 acres have been historically used as "urban" development or as pastures and cropland. The remaining 60 acres, mostly at the Spring Creek site, are native grasslands and shrublands. These communities will be lost. Possible erosion of topsoil and the invasion of weedy species is likely where any ground disturbance occurs. (See Sediment Loading From Developed Areas, P. 55.)

Revegetation plans include stripping and stockpiling topsoil which will be respread in extensive landscaping efforts. Lawns, flower gardens, shrub and tree plantings are planned. Many of the materials to be planted will be grown and tested for hardiness on the property. A grassland seed mixture will be used on unirrigated areas and a lawn mixture will be used on irrigated areas (Table 2). Weed monitoring and control plans have been developed and are currently being employed (see Weed Control discussions below).

Table 2. Seed mixtures for lawns and landscaping.

IRRIGATED LAWN*	UNIRRIGATED AREAS**
33.3% tall fescue	25% crested wheatgrass
33.3% perennial ryegrass	15% slender wheatgrass
16.7% creeping red fescue	15% annual ryegrass
16.7% Chewing's fescue	10% Kentucky bluegrass
	8% western wheatgrass
100%	8% hard fescue (Durar)
	8% blue grama
	5% Canada bluegrass
	5% sheep fescue
	1% sand drop
	100%

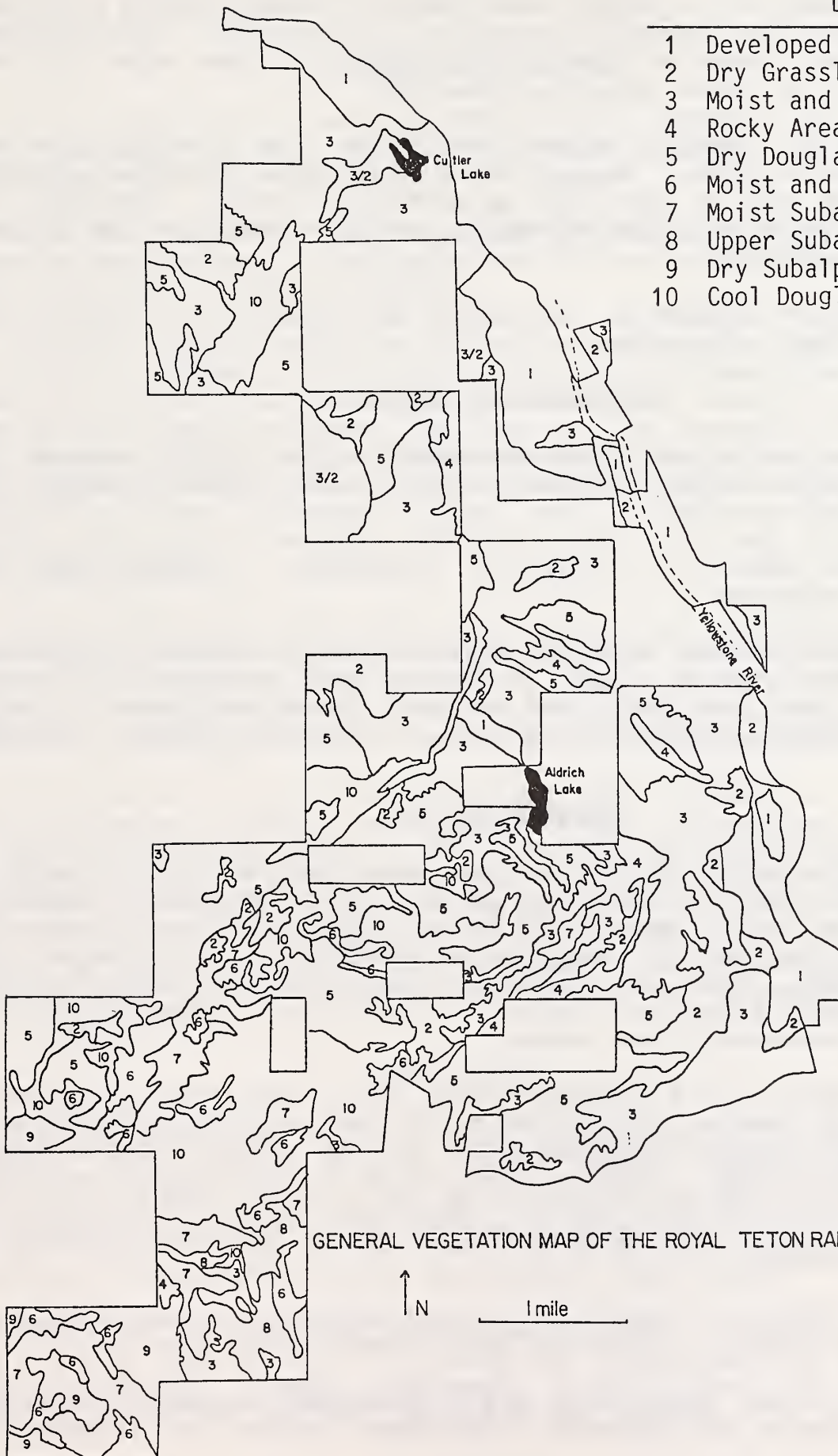
* Applied at 150 lbs/acre.

** Applied at 15-20 lbs/acre; watered by hand or sprinkler for first three weeks after planting until established.

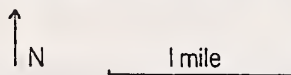
Map 11

Legend

- 1 Developed Lands
- 2 Dry Grassland and Meadow
- 3 Moist and Dry Shrublands
- 4 Rocky Areas
- 5 Dry Douglas-Fir Types
- 6 Moist and Wet Grassland/Meadow
- 7 Moist Subalpine Fir/Spruce Types
- 8 Upper Subalpine Types
- 9 Dry Subalpine Fir Types
- 10 Cool Douglas-Fir Types



GENERAL VEGETATION MAP OF THE ROYAL TETON RANCH



AGRICULTURAL DEVELOPMENT

Approximately 825 irrigated acres have been or will be put into food, forage and other plant materials production on the property. These acreages have either been farmed or grazed prior to 1981. Of these acres, 240 have been or will be put under irrigation since 1981.

Invasion of nonnative grasses and grains onto adjacent range and timbered lands is likely. However, these nearby areas have been subjected to invasion by most of these species during past years. Therefore, no significant impacts to native vegetation are anticipated from the proposed agricultural activities.

Under current management, the quality and productivity of pasture and cropland is likely to increase.

LIVESTOCK AND GRAZING

Sheep and cattle are raised and grazed on the 15,000 acres of the Church's property. Three U.S. Forest Service grazing permits supplement the RTR-S grazing plan.

Potential impacts are related to overgrazing. Riparian areas are particularly sensitive.

Mitigating measures employed on the RTR-S to prevent overgrazing include herding, fencing, water development and production/utilization monitoring. Cows are distributed in small groups and herded to avoid prolonged stream-bottom grazing and also to efficiently utilize the upper elevations.

CONFERENCE SITE

The conference site is located in Mol Heron Creek and occupies about 60 acres. Impacts will include trampling and loss of the native understory (the vegetation growing beneath the larger trees in a forest) component. Trampling may lead to poor vegetation reestablishment, soil erosion, dust and weed invasion. Trail and cross-country hiking will be frequent within a 5-10 mile radius of the site. Impacts in the vicinity of the site will be the same but considerably less severe.

Use of the site at a favorable time of year (early summer) will lessen the severity of impacts. Although the native plant community structure will be lost on the immediate conference site, the site will be seeded to reduce compaction and erosion. Extensive tree cutting is not planned. Individual trees which are killed by disease or that may be disease vectors for mountain pine beetle or spruce budworm will be cut if they do not respond to pesticide treatments.

Vehicle traffic is restricted and road surfacing is done to decrease dust and deterioration of roads (see Dust and Dust Control discussion).

An informational guide given to all participants addresses hiking and camping techniques and etiquette. Low-impact methods are discussed at

length and are encouraged.

Yearly revegetation and weed control is planned. The entire conference site is also fenced to prevent grazing and trampling by livestock.

DUST AND DUST CONTROL

Dust is generated by vehicle traffic on the gravel roads used on the RTR-S. Although it does not kill vegetation outright, plants that are continually coated with dust become less vigorous.

Road improvement and resurfacing are proposed on the RTR. This will reduce impacts from dust. A magnesium chloride product is being tested as a roadbed stabilizer and dust controller.

Magnesium in high enough concentrations can be toxic to plants (Meyer et al. 1973). However, no published literature was located that has tested magnesium chloride toxicity on plants or leachability through the soil. The Environmental Protection Agency (EPA) does not list magnesium chloride as a toxic chemical (Harris 1987). Limited tree killing and injury associated with magnesium chloride has occurred in a Utah campground, but the exact mechanism of injury is unknown (Vandre 1987). When properly applied, no adverse impacts have been observed (Hansen 1987; Driscoll 1987; Phillips 1987; Vandre 1987).

Last summer (1987) some trees and shrubs along portions of Mol Heron road became discolored after the road had been treated with magnesium chloride. A study was done by Montana State University Professor Earl Skogley, and subsequent samples proved to be within normal ranges when compared to information from the chemical producer, Kaiser Chemicals.

The affected trees in the canyon have begun to recover. Trees in a similar proximity to roads in other parts of the ranch were not affected by the application of the chemical. Since no herbicide had been used in along the Mol Heron road, it was concluded that the roots of some of the trees and shrubs extended under the road in narrow portions of the canyon and possibly came in contact with the chemical. To prevent this from happening in the future, the ranch will follow Professor Skogley's recommendation of applying gypsum to those areas around trees in the canyon that appeared to be sensitive to the chemical.

WEED CONTROL

Noxious weeds observed on the RTR-S include spotted knapweed, Russian knapweed, Canada thistle, Russian thistle, foxtail, common hound's-tongue and other broadleaf species such as burdock and pigweed. Within an integrated program to control these weedy species, herbicides may be used on pasture, croplands, construction sites, road projects, mountain roads and on previously infested areas such as the railroad right-of-way.

Tordon 22K (picloram) is used in most cases. It acts on broadleaf plants and is applied onto the foliage in a spray solution with ground spraying equipment. Roundup (glyphosate), which is used only to a limited extent on the RTR-S, controls broadleaves and grasses. It is applied to

foliage by wiper applicator. Both herbicides will damage or kill nontarget vegetation (USDI-BLM 1986).

Impacts to surrounding vegetation are most likely when the herbicide is used on the mountain and range roads. Tordon will be used in these situations. The residual control period is 1-4 years, depending on soil characteristics (French and Lacey 1983; USDI-BLM 1986).

Proper application and handling of the herbicides will minimize or prevent impacts to native vegetation. Factors to consider include plant growth stage of both target and nontarget species at the time of application, soil conditions, wind and imminence of rainfall.

A weed control program to control, limit and eradicate all noxious weeds on the RTR properties has been established. The program is run by an appointed weed control specialist. The stated philosophy is to use the least harmful and most effective method(s) (Francis, pers. comm.).

Two ranch personnel have a Farm Applicator Special Use Permit from the Montana Department of Agriculture. Ranch personnel are educated on identification of the noxious weed species of concern and on methods to reduce their establishment or spread. Weed locations are mapped, controlled and monitored. Herbicides are not applied along ditches or waterways. Hand pulling, cultivation or mowing are used to control weeds in these situations and as much as practicable elsewhere. Strategic use of crops and cover crops is also part of the weed control approach.

Adjacent property owners are notified when and where herbicide applications are going to occur.

WESTERN SPRUCE BUDWORM TREATMENT

The RTR-S forest lands in the Mol Heron Creek drainage and surrounding areas, including the Aldridge Lake, Spring Creek and Beattie Gulch areas, are historically unmanaged forests and have not been harvested to any significant extent since the 1950s. The resulting stands are generally dense and stunted and exhibit high competitive stress and low productivity.

According to the Church, the main concern has been to promote the overall health, vigor and aesthetic beauty of its forest land. In the years 1982-84, it was observed that there were increasing infestations of western spruce budworm (WSBW) on various parts of the ranch and moderate damage in some areas. By late spring 1986, the Mol Heron drainage was experiencing an epidemic infestation, according to field observations made by a forest ecologist and other consultants.

There was nearly 100% infestation of Douglas fir and significant infestation of Engelmann spruce noted. This infestation was resulting in severe defoliation, a significant decrease in cone and seed production, extensive ground damage, extensive defoliation and damage to regeneration and the possible mortality of already highly stressed mature trees.

A determination was made by the consultants in coordination with ranch management that treatment of the infestation would reduce levels of damage

and mortality and allow time to develop a long-term management program for forest recovery and regeneration. An entomologist was hired to research and recommend a nonenvironmentally hazardous and nontoxic insecticide treatment program. His recommendations included a proposal to use the biological insecticide Bacillus thuringiensis (B.t.).

In his report he noted, B.t. "is a biological insecticide effective against a very narrow range of insect species, of which the western spruce budworm is one"; whereas, with the use of other chemical insecticides known to be effective against WSBW such as Carbyl and Acephate, "the potential exists for effects on other than target populations." The report also goes on to state that the USFS has conducted projects to test the effectiveness of two formulations of B.T., one of which was conducted in Montana, on forest service land near Big Timber.

An aerial application program began the first week of July 1986 on ranch lands in the Mol Heron drainage and adjacent areas in Spring Creek and Beattie Gulch.

The initial post-treatment field evaluation indicated approximately a 50% mortality of the WSBW larvae. More exact data will be revealed as WSBW populations continue to be monitored in 1987.

Concerns were expressed that the 1986 forest spraying on the RTR-S could have caused adverse effects to the environment and/or human health.

As previously mentioned, B.t. products differ from most other insecticides in that they are biologically rather than chemically based. The product is a type of bacteria that is highly specific to the species it affects. It has been shown to affect only the Lepidoptera family (moths and butterflies), of which WSBW is a member. This bacteria has not been found to affect any other form of animal or insect life besides moth larvae.

The proposed follow-up for 1987 and future years will consist of four basic parts:

- Monitor insect populations in April and May to anticipate the severity of defoliation (and the possible necessity for additional treatment) and to help determine immigration levels to the area the previous summer.
- Institute collection of seed stock from trees exhibiting resistance to WSBW infestation. Begin to produce seedlings in nursery for future replanting programs.
- Conduct an egg-mass survey in late summer to anticipate subsequent year population levels, to determine immigration levels and to anticipate the need for insecticide application in the following year.
- Develop a long-term management plan to promote forest health and vigor, minimize the potential for future WSBW (and mountain pine beetle) infestations and phase out the need for insecticide treatment.

WATER QUALITY, QUANTITY AND DISTRIBUTION

SITE DESCRIPTIONS

The plans and specifications for water supply and sewage treatment for the Eastgate Work Camp and the Spring Creek Church Headquarters were submitted to DHES for review and approval in the summer of 1986. It was the submission of these plans and specifications that generated considerable department and public interest and led ultimately to the decision by DHES to write the EIS.

All water and sewage systems now under review will have to meet the department's minimum design standards, i.e., the "Recommended Standards for Water Works, 1982 Edition" and the "Recommended Standards for Sewage Works, 1978 Edition." Descriptions of the water and sewer systems (existing and proposed) at the various sites are included below. Population figures provided by the Church for the various sites are given in Table 3. Following the descriptions, projected impacts on the Yellowstone River from construction of new sewage systems are discussed. It should be noted that the department has direct review jurisdiction only over proposed public water and sewer systems (unless the applicant proposes a subdivision). A public water or sewer system is one that serves at least 25 or more people or 10 or more service connections for at least 60 days of the calendar year.

RANCH OFFICE

The well water supply serving the Ranch Office is a previously existing system that does not require department review, but is being monitored for water quality.

The Ranch Office is served by a number of sewage systems. There are various small nonpublic septic tank and drainfield systems serving the dwellings and offices at this location. Most of the dwelling units and offices are new mobile or modular structures. Approximately 37 people live at this location now and that number is not proposed to increase. The Park County Health Department has issued permits for newer systems installed by the Church at this location. The only public sewage system at the Ranch Office is the proposed system to serve the recently constructed slaughterhouse and vegetable processing facilities. (This system is regarded as public because there will be at least 25 people working there.) This system is proposed to be a septic tank and pump-dosed drainfield installation. It will be situated at the edge of the cultivated field just east of the vegetable processing building which is housed in a previously existing barn. The location of this system is approximately 800 feet from the Yellowstone River. If approved, it is proposed that construction of this system would begin immediately.

SPRING CREEK CHURCH HEADQUARTERS

Spring Creek is an unoccupied, previously undeveloped site. The development of this site is proposed to take place in 2 phases. The first phase is to include a partially completed version of the Montessori School, a chapel, a dining hall/community center and office facilities. The second

Table 3

EXISTING AND PROPOSED RTR DEVELOPMENT
ALONG THE YELLOWSTONE RIVER NEAR CORWIN SPRINGS¹

	Houses & Cottages	Mobile/Modular Dwellings	Office Buildings	School Bldgs.	Church Bldgs.	Other Structures	Acreage Developed	Occupancy
1. EXISTING DEVELOPMENT								
a. East Gate	0	0	0	0	0	0	0	0
b. Camp Mustang	1	8	13	5	0	3	8	58
c. Cinnabar	4	11	0	0	0	4	10	40
d. New Ranch HQ	0	16	8	0	0	3	15	114
e. Ranch Office	2	6	7	0	0	5	10	37
f. Spring Creek	0	0	0	0	0	0	0	0
g. Other Areas	2	0	0	0	0	5	5	7
TOTALS	9	41	28	5	0	20	48	256
2. PROPOSED ADDITIONS								
a. East Gate	0	9	0	0	0	0	5	64
b. Camp Mustang	0	4 ²	(12) ³	(5)	0	0	0	(16) ²
c. Cinnabar	0	0	0	0	0	0	0	0
d. Ranch HQ	0	2 ²	(5) ²	0	0	3	4	24
e. Ranch Office	0	0	0	0	0	1	0	0
f. Spring Creek	0	45	14	10	1	3	60	264
g. Other Areas	1 ⁴	0	0	0	0	3	1	4 ⁴
TOTALS	1	60	(3)	5	1	10	70	340 ⁵
3. CUMULATIVE TOTALS	10	101	25	10	1	30	118	596

Notes:

1. Approx. 3,250 acres is owned by RTR between Gardiner and Yankee Jim Canyon within one mile of the Yellowstone River.
2. Camp Mustang residential occupancy is to be 12 mobile homes (families) at 3.5 occupants each on the average.
3. Modular office buildings at Camp Mustang eventually to be removed and replaced with office building at RHQ, including the removal or conversion of use of approximately six other modular office buildings at RHQ (two to be converted to housing).
4. Former railroad section house one mile north of ranch (Sphinx Station) to be moved onto ranch by 1988.
5. Total added occupancy includes space for 160 students and 180 staff.

phase is to include housing for school staff, students and visitors, additional offices, additional dining hall staff and seating capacity, a laundry, additional Montessori school faculty and students, Summit University faculty and students, additional chapel seating capacity and a gymnasium. When fully developed, it is proposed that there will be 264 people living at this site.

The water system proposed to serve the Spring Creek facilities is planned to be built in 2 stages. The first stage will include wells, a pump house, pressure tanks and distribution system capable of providing domestic water to a portion of the facilities to be built first.

The second phase of the proposed system is designed to provide water for domestic purposes and for fire protection to all planned facilities. The system will include 2 wells, 2 pump control buildings, a distribution system with fire hydrants and 200,000 gallons of gravity storage.

Sewage treatment for both phases is to consist of an aerated lagoon system and irrigation of a fodder crop and trees on 38 acres of nearby land with the treated, disinfected sewage effluent. Aeration of the 3 pond lagoon system will be tapered in intensity as sewage flows through the ponds. Most of the oxidation of the biological oxygen demand (BOD) in the sewage will take place in the first 2 ponds where the aeration intensity is the highest. The third pond will be a storage pond that will store sewage for at least 7 months at full occupancy of both phases. This will permit sewage to be stored during the winter when irrigation is impractical. Irrigation will take place from late April or early May until late September. Scheduling of irrigation periods will allow time for harvest of the fodder crop. A licensed wastewater treatment operator will be available for operation of the system. Design of the system will minimize the amounts of seepage from the ponds and deep percolation from the irrigated areas.

Phase 1 of sewage system construction will serve phase 1 of the development. Phase 1 construction will consist of all 3 sewage lagoon ponds and associated appurtenances for treatment and a sewage pumping station to lift sewage wastes to the ponds from the development. Phase 1 sewage system construction is scheduled for completion within 18 months of approval, if approval is granted. It is projected that phase 1 sewage system construction will serve phase 1 of the development for 2.5 years before it is necessary to irrigate the sewage effluent. Phase 2 of sewage system construction will include all irrigation system improvements for irrigation of sewage lagoon effluent. Phase 2 sewage system improvements are scheduled for completion within 2 years of DHES approval, if approval is granted.

EAST GATE (CAMP MUSTANG)

Camp Mustang is an existing DHES-licensed campground/trailer court at Corwin Springs that is being used by the Church primarily for housing and for offices. It is located at Corwin Springs between the highway and the river and is the site of the old Corwin Springs Plunge. Camp Mustang is licensed for 65 recreational vehicle (RV) spaces, 16 mobile home spaces, 20 tent spaces and a cabin.

An existing well water system serves the existing licensed facilities

at Camp Mustang. This system is not under review, but is being monitored for water quality.

Two sewage systems serve Camp Mustang. System 1 is the original system that served Camp Mustang before the Church purchased the property. System 2 is a newer, nonpublic septic tank and drainfield system that was approved by Park County in 1984. There are presently 10 mobile or modular homes (2 of which are offices), 1 cabin and a shower house that are connected to system 1. Thirty-three adult residents, 18 children residents and 112 day-users use system 1 on a daily basis. System 2 serves a shower facility during the Church's summer conference. This facility is used by attendees of the conference for approximately 2 weeks in late June and early July. During the remainder of the year, system 2 serves a modular home with 7 residents, 2 other resident workers and 13 day users. When the conference is in progress, these people use the same temporary shower and rest room facilities used by conference attendees.

EAST GATE WORK CAMP

The East Gate Work Camp is a proposed development that will provide housing mainly for Summit University students and faculty. Laundry facilities for the residents will be provided. This proposed site is immediately north of the existing Camp Mustang. Seven modular homes and 2 small cabin structures are proposed to house a total of 64 faculty, students and a few visitors.

The East Gate Work Camp System is proposed to provide water to the Church owned student and faculty housing facilities located in the East Gate area at Corwin Springs. The system design is comprised of 2 wells, a pump house, pressure tanks and a distribution system.

This system is designed to provide water for domestic purposes and limited irrigation of the grounds. No fire protection will be provided initially, but plans are being made to add a system later.

The proposed sewage system will consist of septic tanks and pump-dosed drainfields. The proposed drainfield is about 225 ft from the 100 year floodplain boundary of the Yellowstone River. The bottom of the drainfields will remain at least 4 ft vertically above the 100-year floodplain elevation of the river.

CINNABAR CAMPGROUND AND THE RANCH KITCHEN

Cinnabar Campground and the Ranch Kitchen existed as DHES licensed facilities prior to ownership by the Church. Cinnabar Campground is licensed for 11 mobile home spaces, 30 RV spaces, 30 tent spaces and 14 motel units.

The water system serving Cinnabar Campground and the Ranch Kitchen is an existing well water system that is not under department review, but is being monitored for water quality.

Presently, 4 cottages, 11 mobile homes, the Ranch Kitchen and shower facility utilize the 4 separate sewage systems at Cinnabar Campground. The Church figures indicate that 40 people live at the Cinnabar Campground site.

RANCH HEADQUARTERS

The Ranch Headquarters Water System is designed to supply water to the Church's modular housing (ranch staff), offices, dining hall, laundry facilities and future warehouse located at the Ranch Headquarters site north of Corwin Springs.

The proposed water system consists of 4 wells, a pump house, pressure tanks and the distribution system. Parts of this system have apparently already been constructed and are in use. The system is proposed for the provision of domestic water only, no irrigation and no fire protection. However, a separate system is under construction to provide 38,000 gallons of fire protection delivered at 1,000 gpm, and an additional system already provides irrigation water.

The sewage system serving the Ranch Headquarters was approved by DHES in 1983 and some additional anticipated service capacity for the system was approved in 1984. The system is located about 250 feet from the Yellowstone River. The system was originally approved to serve 12 modular living units, 2 modular units used for offices, 2 modular units used for a laundry, a kitchen and dining hall for Ranch Headquarters residents, a chapel, a warehouse and a shop. The present usage of the system has changed somewhat since the original approval, but the total approved sewage flow from the site has not been exceeded. The chapel was never built but religious meetings are sometimes held in the existing buildings. The shop has not been connected to the sewage system. (At the time of this writing, the shop is just now under construction). Sewage flows from office staff, laundry and meal preparation have increased over the original approved amounts, but, as mentioned above, the total sewage flow has not.

Some additional housing was connected to this sewage system for about 9 months, but these units were disconnected in July of 1987 at the request of DHES, and the sewage from these units is being hauled away and disposed of either at the Gardiner sewage lagoon or at an approved site on Church property. The Church now has submitted plans and specifications for another sewage system to serve these double-wide modular units. It is proposed that 6 units will be used to house 54 people and 2 units will be used for office space for 56 staff. This system will be a septic tank and pump-dosed drain-field system.

BIG SPUR CAMPGROUND

Big Spur Campground is a trailer court/campground that has been previously licensed by DHES. The Church leased the property for 3 years starting in 1986 and has modified the previous use to include more mobile home spaces and less RV spaces. The present DHES license is for 21 RV spaces (7 without sewage service) and 19 mobile homes. The Church has used one of the mobile home spaces as a central kitchen. The kitchen primarily serves the occupants of Big Spur Campground.

The well water system serving Big Spur Campground has been previously reviewed and approved by the department and is being monitored for water quality.

The sewage system for Big Spur Campground is a septic tank and pump-dosed drainfield system. This system was installed by the Church as part of the approval for the conversion of RV spaces to mobile home spaces. The drainfield is more than one-half mile from the Yellowstone River.

Since early August, the sewage flows from Big Spur Campground have been monitored and found to be very close to the flows predicted by the design engineer for the Church. These were the flows that the approval for Big Spur Campground was based upon.

The sewage system previously serving Big Spur Campground was a lagoon system adjacent to Trail Creek that appeared to be undersized and leaking. The lagoon received raw sewage from a pump station that was in poor repair. The new system was installed to overcome the shortcomings of the previous system.

FUTURE NORTH RANCH KITCHEN, NURSERY AND PRESCHOOL

The Church proposes to construct a new kitchen, nursery and pre-school at RTR-N. There has been no indication from the Church when construction is proposed to begin. These facilities would serve Church members living and working in the north ranch area. The kitchen would serve approximately 200 people daily. Sewage treatment would be provided by septic tanks and drainfields.

IMPACTS OF CHURCH DEVELOPMENTS ON THE YELLOWSTONE RIVER

SEDIMENT LOADING FROM DEVELOPMENT AREAS

Sediment runoff from proposed development areas will likely occur during and shortly after construction at the East Gate and Spring Creek sites. The Church has submitted plans for erosion control at these sites during and after construction. Plans include hay bales to control sediment runoff at these sites and reseeding the areas after construction is complete.

In order to estimate whether short-term construction activities will have an impact on the Yellowstone River, some accepted method of estimating sediment runoff is needed. To estimate the sediment runoff from the sites, the Universal Soil Loss Equation (USLE) was used. The USLE is as follows:

$A = (R) \times (K) \times (L) \times (S) \times (C) \times (P)$
where A = annual soil loss
R = rainfall factor
K = soil erodibility factor
L = slope length factor
S = slope gradient factor
C = cropping management factor
P = erosion control practice factor (1).

According to the Soil Conservation Service, the soils in the area of the 2 sites are quite susceptible to erosion. Conservative estimates for all factors were used so that sediment runoff from the sites would not be underestimated. For instance, the soil erodibility factor for the Spring

Creek site was estimated at 0.60. (This factor ranges in magnitude from 0.03 for stable soils to 0.69 for the most erosive soils). It was calculated that the runoff from the 2 sites would be approximately as follows:

Spring Creek site - 17.31 tons per acre per year
East Gate site - 6.28 tons per acre per year.

These amounts were then compared to the average sediment amounts measured in the Yellowstone River at Corwin Springs during 1985 and 1986. This average is probably a low average because 1985 was a very low runoff year and consequently the sediment amounts were also quite low. It was found that the estimated amount of runoff sediment from the proposed development sites at East Gate and at Spring Creek was about 0.1% of the 1985 and 1986 annual averages in the river. Although it could perhaps be argued that this is significant on a long-term basis, it is regarded as insignificant for several reasons. First, the estimate of runoff sediment from the sites is felt to be high because the factors in the USLE were intentionally chosen conservatively. Also, the sites will receive some protection against runoff during construction as indicated above. Also, measured sediment figures for 1985 for the Yellowstone River were probably lower than the actual average because of the low runoff. This would have the effect of making the impacts from the developed sites appear relatively more significant than for a more normal runoff year. Finally, the impacts from construction are short-lived and are limited to the period during and shortly after construction. It is for these reasons that impacts from runoff sediment to the river are not considered to be significant.

MICROBIOLOGICAL AND NUTRIENT WATER QUALITY IMPACTS

In order to predict what impacts the various Church developments would have on the Yellowstone River, the Church provided DHES with future occupancy figures for the various developments in Park County. (If approvals for the new sewage systems are granted, these population figures will be referenced in the approval documents).

The potential impact upon the river from sewage treatment facilities was the primary concern investigated. Impacts could result from increased nutrient loading (nitrogen and phosphorus) to the river, or from microbiological contamination.

Microbiological contamination of the river could result from septic tank and drainfield installations that are in close proximity to the river. Although the existing and proposed systems meet the criteria for public septic tank and drainfield installations, potential impacts upon the river were investigated because of the concern over the location of the installations. The systems that have the greatest potential for impacts upon the river are the existing and proposed systems at the Ranch Headquarters and the proposed system for the East Gate Work Camp.

To estimate what impacts the systems may have upon the river, available fecal coliform data were collected from the Yellowstone River at Corwin Springs. (Fecal coliforms are part of the total coliform group of bacteria and are commonly tested for to detect contamination originating from the intestines of warm-blooded animals). The data are quite limited and dated

(1974-1977). However, these data indicate that the river at that time had a good bacteriological quality. The fecal coliform concentrations averaged about 15 colonies per 100 milliliters of sample. (For reference, the Yellowstone River is classified as B-1 at this location. B-1 waters have a maximum allowable concentration of 200 fecal coliforms--which could produce up to 200 colonies in culture--per 100 milliliters. As a comparison, waste from a septic tank effluent averages about 160,000 colonies per 100 milliliters. The flow in the Yellowstone River averages about 3,116 cubic feet per second at Corwin Springs. The 7 day, 10 year low flow is about 516 cfs. The flow from the 3 septic tank and drainfield systems mentioned just previously will average about 20,500 gallons per day. If it is assumed that the drainfield systems reduce the fecal coliform concentrations by an average of 1 order of magnitude before the effluent reaches the river, the impacts upon the river should not be detectable during a 7 day, 10 year low flow period. In other words, the increase in fecal coliform concentrations should be less than 1 colony per 100 milliliters.

All drainfields are, or will be, dosed to promote drying of the fields in between cycles. This will help to prevent large saturated fronts of septic tank effluent from developing. The large saturated fronts are desirable because they promote movement of microorganisms through the soil profile. Dosing of the effluent will allow the soil to dry out between doses, promoting adsorption of the microorganisms on soil particles. Also, the climate in the area is quite dry. The lack of significant precipitation will also help to prevent development of saturated conditions below the drainfields. Based upon the above discussion, no measurable impacts upon the Yellowstone River are anticipated. However, lining of the drainfield trenches with sand may be a desirable additional precaution against movement of microorganisms. Flow monitoring may also be required at new and existing sites.

Estimates of increased nutrient loading to the river were obtained by calculating the additional population that would be utilizing the new sewage facilities that the Church has installed, or proposes to install, at the South Ranch in proximity to the river. Two existing DHES licensed facilities (The Ranch Kitchen and Cinnabar Campground) were not considered in the estimates. Before these licensed facilities were excluded from the estimates, however, the sewage loading resulting from the future anticipated usage and occupancy was examined to make sure that it did not exceed the existing licensed amounts. The seasonal nature of the sites was taken into account in making these comparisons. At Camp Mustang, some additional sewage generation over previously licensed amounts is estimated to occur due to the future anticipated year-round population. See Table 4 and the discussion below for the estimates of additional nutrient loading from Camp Mustang.

The various sources of nutrient loading from the Ranch Office and food processing facility are summarized in Table 4. Although the primary sources are human, animal wastes from the slaughterhouse are also included.

Table 4. Sources of Nutrient Loading

Table 4. Summary of nutrient loadings from the Ranch Office/Food Processing Site. All values in pounds per year.

Source	Nitrogen	Phosphorus
Chicken	123.8	26.0
Turkey	130.4	13.0
Beef	10.2	0.8
Deer	8.2	0.6
Elk	30.6	2.2
Staff*	529	74
TOTALS	832.2	116.6

*Note: Based on discussion with Jim M. 1/4/88.

TABLE 5. Summary of nutrient loadings from the Royal Teton Ranch/South Ranch, excluding capacity of previously licensed facilities (i.e., Camp Mustang and Cinnabar Campground). All values in pounds per year.

Source	Nitrogen	Phosphorus
East Gate Work Camp	915	128
Camp Mustang	86	12
Cinnabar Campground	0	0
Ranch Headquarters	1,973	276
Ranch Office	832	116
Spring Creek	1,101	154
TOTALS	4,907	686

Where subsurface sewage treatment was utilized for year-round residents, it was assumed that all of the nutrients present in wastes from all the sources in Table 4 would reach the river (this excludes existing licensed capacity at licensed sites). This is a conservative assumption since soils have some capacity to absorb phosphorus and there will be some uptake of nitrogen by local vegetation. At the Spring Creek site, the amount of nutrient loading was estimated by calculating the allowable leakage from the lagoon cells and converting this amount into a population equivalent. It was assumed that no nutrient loading will occur from the application of lagoon effluent on the fodder crop. The application of effluent to the spray irrigation area will be designed to prevent deep percolation past the root zone. The fodder crop will have to consist at least partially of a grass that will utilize nitrogen in its growth. Additionally, the site where the lagoon cells and spray irrigation area are located is about 80 feet vertically above the river and approximately 1,000 feet horizontally from the river. This will provide attenuation of phosphorus in any sewage that does seep from the site. As mentioned above, some additional nutrient loading was included from Camp Mustang. This amount was estimated to be equivalent to 6 additional people over the existing licensed capacity of the site. No additional nutrient loading above the existing licensed capacities was anticipated from The Ranch Kitchen and from the Cinnabar Campground. The anticipated nutrient loading from the various sites is summarized in Table 5.

DISCUSSION OF WATER QUALITY IMPACTS FROM SEWAGE NUTRIENTS

This section addresses the effects that nutrients contained in treated wastewater would have on the growth of algae in the Yellowstone River. Sewage from offices, living areas and a proposed food processing plant would be treated to remove solids and oxygen-demanding materials, leaving nutrients (nitrogen and phosphorus) as the primary wastewater constituents.

Nutrients would also be contained in sediments that may wash into the river from disturbed construction sites. The algal growth-stimulating effects of these nutrients are not anticipated to be significant because the expected sediment yield is small (see page 55). Only a fraction of sediment-bound nutrients (usually less than 20%) is biologically available, and the growth enhancing effects of these nutrients may be offset by the physical, growth-inhibiting effects of the sediment itself (as turbidity and deposited sediment). Moreover, the effects of sediment from construction areas would be short-term, until disturbed sites are revegetated.

Three questions were posed regarding nutrient effects on the Yellowstone River: (1) What would be the increase in nitrogen and phosphorus concentrations in the river; (2) Will stream-bottom algae respond to this increase and if so, by how much, and (3) What effect would this response, if any, have on other aquatic life and resources? In seeking answers to these questions, the DHES made five assumptions.

1. Nutrient inputs from previously approved sites would be excluded from consideration;
2. Living units would be totally occupied;

3. No nutrients would be removed in wastewater treatment;
4. All wastewater nutrients would be biologically available to algae, and
5. All nutrients would eventually reach the river* and arrive uniformly throughout an average flow year.

These assumptions allow for the assessment of near-maximum possible impact. (Effects would be larger in a low-flow year, but smaller in a high flow year.)

Per capita nutrient loadings in domestic wastewater (2 lb phosphorus/-year and 14.3 lb nitrogen/year) were based on a report by Uttormark and others (1974) and modified to reflect reduced phosphorus content of modern laundry detergents. Total annual nutrient loadings from the Ranch Office and slaughterhouse (116.6 lb phosphorus and 832.2 lb nitrogen) were based on figures taken from Environmental Protection Agency (EPA) development documents for red meat and poultry-processing point source categories and on estimates of domestic animal and wild game harvest provided by the applicant. Nutrient loadings from the Ranch Office and other sites are summarized in Tables 4 and 5.

Using the total nutrient loadings from Table 5 (4,907 lbs of nitrogen and 686 lbs of phosphorus per year), the RTR-S would increase concentrations of biologically available nutrients in the Yellowstone River by 0.000112 mg/l for phosphorus and 0.000798 mg/l for nitrogen at an average river flow of 3,122 cfs. These increments represent less than 1% of the existing average concentrations of these nutrients in the river (Table 6) and would not be measurable using conventional analytical techniques. Nutrient increments would be larger at river flows less than 3,122 cfs and smaller at river flows larger than 3,122 cfs. An unknown portion of these nutrients probably would not reach the river.

The next step is to assess what effect these increments of nutrients would have on algal growth, other aquatic life and the appearance of the river.

Recreationists, landowners, fish and water quality managers are generally more concerned with the potential accumulation of algae on stream bottoms than they are with algal growth rates per se. Heavy stands of algae on stream bottoms are unattractive to some people and may, in the extreme, physically impair other aquatic life. For example, they may reduce dissolved oxygen concentrations or trap emerging fish fry.

* Sewage from the Spring Creek site is to be treated by an aerated lagoon/storage cell/wastewater pond system followed by sprinkler irrigation. The sprinkler irrigation appears to be designed so that deep percolation of wastewater will be avoided. However, some wastewater leakage from the ponds is allowed and only the nutrients in this seepage are assumed to reach the river.

Many factors control the accrual of algal biomass on stream bottoms. Among the most important are: concentrations of macronutrients (notably nitrogen and phosphorus); concentrations of micronutrients (most commonly silica and iron); rate of nutrient uptake by algae; water temperature; turbidity and light penetration; substrate size, texture and composition; sediment deposition (blanketing); ice and sediment movement (scour); current velocity; colonization from upstream, and grazing by macroinvertebrates.

Studies done by Bothwell (1985) in the Thompson River of British Columbia indicate that diatom algae achieve their maximum growth rates at very low levels of ambient dissolved phosphorus (less than 0.010 mg/l). More recent work by Bothwell, also on the Thompson River, shows that lotic (swift-moving waters) periphyton communities composed largely of diatoms respond to nutrient additions in a nonlinear fashion (Figure 2) and that maximum sustainable biomass is closely approached at ambient nutrient concentrations as low as 0.025 mg/l for phosphorus and 0.030-0.040 mg/l for nitrogen (Max Bothwell, National Hydrology Research Center, Saskatoon, Saskatchewan, telephone conversation with Loren Bahls, November 14, 1986).

Hence, in comparable western rivers where the periphyton flora is dominated by diatoms, algal biomass would not increase appreciably above these "saturation" concentrations of ambient nutrients. Saturation concentrations would be somewhat higher in streams where other kinds of algae (e.g., greens or bluegreens) predominate (Max Bothwell, personal communication, November 14, 1986).

TABLE 6 Concentrations of ortho-phosphorus (O-P) and inorganic nitrogen (I-N) in the Yellowstone River at Corwin Springs. All values in milligrams per liter.

Agency	Dates	Variable	Number of Obser- vations	Max.	Min.	Mean	I-N:O-P*
Mont	01/78-09/78	I-N	13	0.69	0.05	0.14	---
Mont	10/74-09/78	O-P	30	0.078	0.007	0.024	6
USGS	07/69-12/73	I-N	25	1.96	0.03	0.35	---
USGS	10/72-12/73	O-P	7	0.10	<0.01	0.037	9

* Ratios of less than 5 indicate a potential for nitrogen to be limiting; ratios larger than 10 indicate a potential for phosphorus to be limiting; ratios between 5 and 10 indicate a potential for either nutrient to be limiting (Zison and others 1977).

The periphyton flora of the Yellowstone River above Livingston is dominated by diatoms in spring and fall and by green algae (Cladophora, Enteromorpha and Ulothrix) in summer (Bahls et al. 1981; unpublished Water Quality Bureau data). Average annual nitrogen to phosphorus ratios (Table 6) indicate that these two nutrients are probably co-limiting at Corwin Springs. Seasonal nitrogen to phosphorus ratios (Table 7) tend to show that nitrogen is limiting in spring and summer and phosphorus is limiting in fall and winter, although the fall and winter results are inconclusive because of the small number of phosphorus measurements.

On the average and from late spring through early fall, nutrient concentrations in the Yellowstone River at Corwin Springs appear to be at or well in excess of values required to achieve maximum sustainable biomass of periphyton (Tables 6 and 7). However, in late fall and winter, biologically available phosphorus concentrations may be somewhat smaller than concentrations required to achieve maximum biomass (Table 7). During late fall and winter, a small increment of phosphorus may produce a small increment of algal biomass. But since ambient phosphorus concentrations are already close to the saturation point for algal biomass, the increase in periphyton growth would be much smaller than if the phosphorus was added to a lower "baseline" (see Figure 2). Also, periphyton standing crop more likely would be regulated by factors other than phosphorus at this time of year, notably poor light, low temperature and ice scour.

An alternative theory holds that there is no saturation point for nutrients in rivers and that algae continue to accumulate in a linear fashion as more nutrients are added, until some other factor (e.g., grazing, temperature, scour) becomes limiting. This theory has prompted the EPA to set nutrient guidelines for preventing nuisance algal growths in flowing waters: 0.1 mg/l total phosphorus (EPA 1986) and 1.0 mg/l total inorganic nitrogen (Thomas Entzminger, Data Analysis Branch, Surveillance and Analysis Division, EPA Region VIII, Denver, Colorado, letter to Robert Fox, EPA, Helena, June 12, 1981). Mean nutrient concentrations at Corwin Springs (Tables 6 and 7) are well below these guidelines, although maximum recorded values have met or exceeded these levels.

Laboratory studies using the planktonic green alga Selenastrum capricornutum have shown that each incremental unit of biologically usable nitrogen is capable of producing an additional 38 units of algal biomass, assuming nitrogen is limiting and all other variables are favorable for growth (Miller et al. 1978). In the same manner, each incremental unit of phosphorus is capable of producing 500 additional units of algal biomass. Hence, under the "no saturation point/linear response" theory, phosphorus additions from the RTR-S would increase selenastrum biomass in the lab by 0.056 mg/l, regardless of the ambient concentration, but only when phosphorus is limiting.

In 1979, water collected from the Yellowstone River at Livingston was capable of supporting 0.18 mg/l of Selenastrum capricornutum (Bahls et al. 1981). Thus, phosphorus from the RTR-S could theoretically increase the maximum standing crop of Selenastrum in the laboratory by about 30% when phosphorus is limiting. The addition of both phosphorus and nitrogen may produce a larger response.

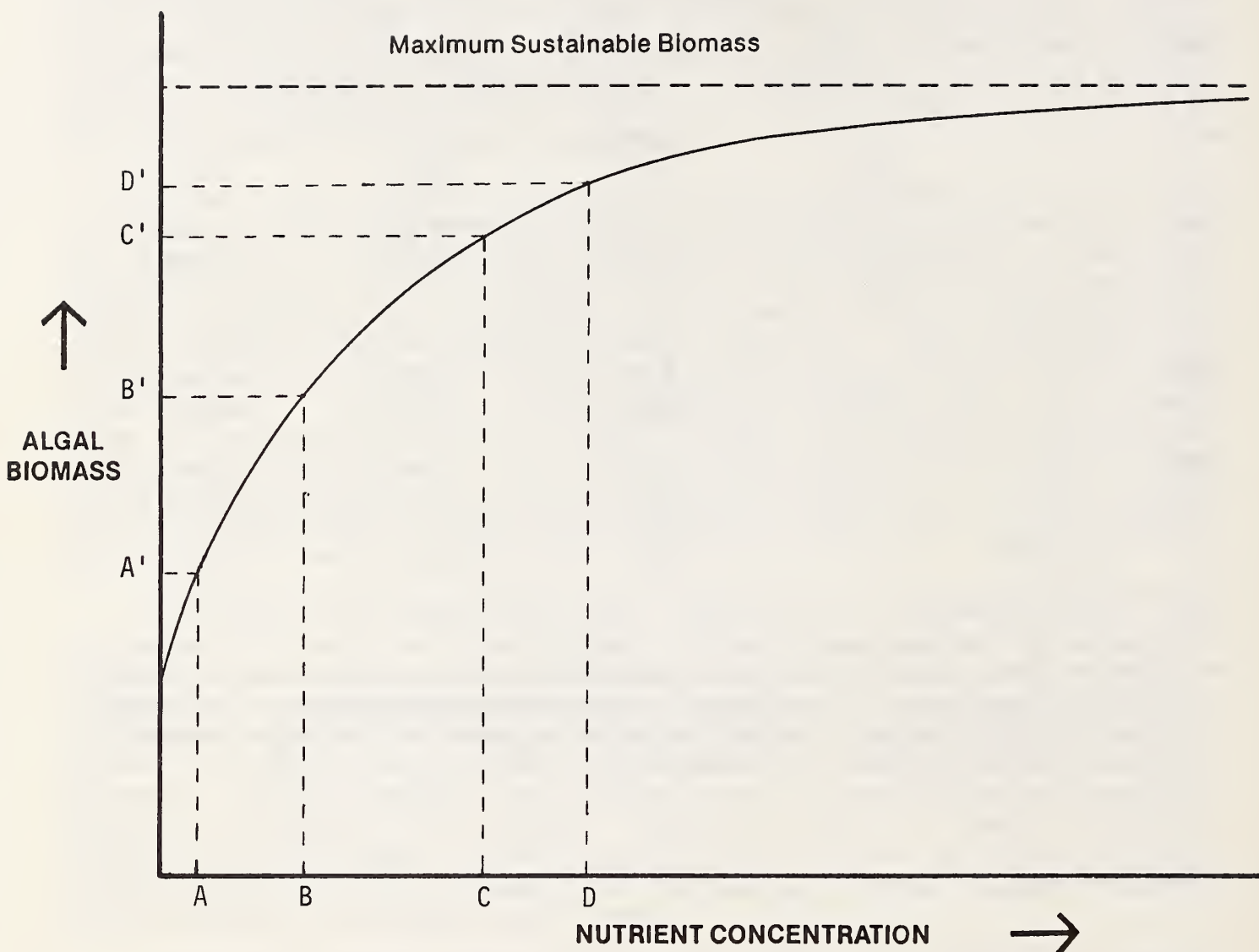
Table 7. Seasonal mean concentrations of ortho-phosphorus (O-P) and inorganic nitrogen (I-N) in the Yellowstone River at Corwin Springs. All values in milligrams per liter.

Agency	Variable	Feb.-Apr.	May-Jul.	Aug.-Oct.	Nov.-Jan.
Mont	I-N	0.27 (2)*	0.07 (7)*	0.07 (3)*	0.69 (1)*
Mont	O-P	0.022 (5)*	0.027 (14)*	0.027 (8)*	0.010 (3)*
	I-N:O-P**	12	3	3	69
USGS	I-N	0.35 (6)*	0.39 (6)*	0.22 (7)*	0.46 (6)*
USGS	O-P	0.04 (1)*	0.02 (1)*	0.042 (3)*	0.037 (2)*
	I-N:O-P**	9	20	5	12

* Number of observations

** Ratios less than 5 indicate a potential for nitrogen to be limiting; ratios larger than 10 indicate a potential for phosphorus to be limiting; ratios between 5 and 10 indicate a potential for either nutrient to be limiting (Zison and others 1977).

Figure 2



Generalized representation of algal biomass response to nutrient enrichment in flowing waters. An increase in nutrient concentration from A to B will increase biomass from A' to B'. An equal increase in nutrients from C to D will produce a much smaller increase in biomass, from C' to D'.

It is not known how this translates to the growth of indigenous attached algae on the bottom of the Yellowstone River. The results of these "bottle tests" cannot be extrapolated to river conditions. The only way to test which theory holds, and to determine how much more algae would be produced, would be to conduct on-site enrichment/algal response studies, either instream or in artificial streamside channels "spiked" with nutrients.

In conclusion, the output of nutrients from the Church's south ranch would increase nutrient concentrations in the Yellowstone River by only a very small amount. These additional nutrients would have little or no effect on periphyton standing crop in the river because the periphyton community is already saturated with nutrients during the peak algal growing season (May-October) and other factors would probably control periphyton growth in late fall and winter when phosphorus is limiting and concentrations of phosphorus are below the saturation value. With little or no increase in algal biomass, the nutrients generated by the development would have a negligible effect on fish and other aquatic life or on aesthetic qualities of the Yellowstone River.

DFWP COMMENTS

The DFWP reviewed the water quality information and had the following comments:

1. [It agreed] with the conclusion that construction activities are unlikely to contribute measurable amounts of sediment to the Yellowstone River.
2. Assumptions used to calculate nutrient loading to the Yellowstone River correctly portray a scenario that is more severe than what is likely to occur. Even using pessimistic assumptions the calculated increases (0.0001 mg/l of phosphorus and 0.0008 mg/l of nitrogen) are essentially unmeasurable. The author correctly points out that nutrient thresholds for green algal growth are higher than those for diatoms. However, most of the discussion centers around thresholds for periphyton. Thresholds for green algae may be more relevant to the Yellowstone River.
3. The author uses a model that says each unit of phosphorus added to water is capable of producing 500 units of algal biomass. Calculations using this model result in a prediction that Selenastrum could increase their biomass in the...[laboratory]...by as much as 30%. Average concentrations of ortho-phosphorus at Corwin Springs (data collected by the state of Montana) was 0.024 mg/l compared to a predicted increase in phosphorus from activities at the Royal Teton Ranch of 0.0001 mg/l. Hence, the average increase in phosphorus is in the neighborhood of only 0.4%. Such a small increase in phosphorus loading is unlikely to result in a measurable change in algal biomass.

These sections of the draft EIS appear to be well thought out and written and conservative assumptions are used....

GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE

The project is located within the Upper Yellowstone River Valley. The valley is bordered on the west by the Gallatin Range and on the east by the Absaroka/Beartooth Range. These mountain ranges consist mostly of volcanic rocks underlain by folded Paleozoic and Mesozoic sedimentary rocks. The older deposits have been exposed in places by the Yellowstone River cutting through the more recent volcanic layer (Alt 1972). At one time the valley was a closed basin of internal drainages. During this time a deep fill of basin sediment accumulated through which the Yellowstone River later cut a valley.

On the north end of the valley is a narrow canyon, and just north of Gardiner at the south end of the valley is Yankee Jim Canyon, another narrow canyon. Between the north canyon and Yankee Jim Canyon the valley is broad, forming the area known as Paradise Valley. Yankee Jim Canyon is just north of the RTR-S and was formed by the Yellowstone River cutting down through the volcanic layer and into the hard Precambrian basement rock which appears on the canyon walls as a folded gneiss.

The geomorphology of the southern end of the valley is very complex because of glacial activity mixed with catastrophic floods caused by the damming of the river and the subsequent release of huge quantities of water. A relatively recent dam formed by a rock slide just below Yankee Jim Canyon backed up the river and on portions of the South Ranch properties. These geologic actions within the last 10,000 years make interpretation of the specific landforms often difficult.

Two prominent geological formations in the southern portion of the upper Yellowstone River Valley and on RTR-S are Cinnabar Mountain and Devils Slide. These are mentioned often in the literature as landmarks. Cinnabar Mountain is just southwest of Corwin Springs and stands out because of its red color.

Early miners gave it this name, thinking that its color was due to large quantities of Cinnabar. It was later found that the red was not mercury but a clinker zone from a burned-out coal seam (Reed 1950). At the base of this mountain to the south is Devils Slide. This is an exposure of almost vertical sedimentary rocks with a red area that is composed of Chugwater mudstone from the Triassic period (Alt 1986).

Of geological and historical significance are the coal beads in the Gallatin Range behind Cinnabar Mountain. These provided the motivation for the early development of the Corwin Springs area, the town of Electric and the coal mines at Aldridge and elsewhere in the area.

Another significant geological feature in the Corwin Springs area is the presence of La Duke Hot Springs. This was the geothermal source for the former hotel, spa and plunge at Corwin Springs (Refer to **Historical and Archaeological** section for a description the facility and to the **Unique, Endangered, Fragile or Limited Environmental Resource** for a discussion of a possible connection of the hot spring to geothermal sources in Yellowstone National Park.)

In general the valley is relatively flat and broad with good grassland for grazing and relatively rich soils for farming. Soils in the valley are grayish-brown and have developed on top of colluvium from the mountains. Soils in the surrounding hills vary from loamy to sandy and gravelly, with vegetation changing with elevation and aspect.

The predominant soils on the RTR-S are Berthoud loams and Prospect bouldery and stony loam. The Berthoud series soils are characterized by being deep light colored soils having a loam surface and a loam substrata that is strongly calcareous. These soils have a high moisture storage capacity and are moderately permiable. Also, according to the Soil Conservation Service, Berthoud soils are "potentially highly erodible."

The Prospect bouldery and stony loam soils are deep chestnut soils having a bouldery and stony loam surface, a stony heavy loam subsoil and a bouldery and stony substrata, with soil textures of loam to sandy loam. These soils are moderately permeable.

A third, less-common soil series found in the valley is Larimer gravelly loam. This soil consists of brown soils having a gravelly loam surface, a light clay loam subsoil and a gravelly loam substrata. These soils are moderately permeable, with a low-moisture capacity. They are also cited as being "potentially highly erodible." The climate is typical of high intermountain valleys in the Rockies, with great daily temperature extremes. Of significance to the prehistoric populations, however, is that the valley was generally snow free in the winter months. This factor is perhaps the most significant reason why the valley had such intensive use prehistorically.

AESTHETICS

The aesthetic qualities of the Corwin Springs area have changed appreciably since the Church purchased the Forbes Ranch. The town and adjacent land began to change from being small and rural to a more urban community.

The town was the focal point for small property owners up and down the banks of the Yellowstone River and for ranchers in the area. The 3 areas of initial development were in the East Gate Work Camp, adjacent to the former Corwin Springs Plunge, the Ranch Headquarters, across the river and downstream from the work camp and the Ranch Office, on the west side of the river and upstream.

For the most part, the Ranch Office retained its previous appearance of being the headquarters of a working ranch. The house was renovated and new buildings were added to the existing outbuildings. Persons traveling on the highway across the river would find it difficult to distinguish from any other working ranch in the area.

The Ranch Headquarters went from principally undeveloped land to a planned unit development, including a nursery and tree farm enclosed by a chain link fence, creating a "compound" appearance.

East Gate became a cluster of modular dwellings encircling the former plunge.

According to information provided by the Church, more work will be done in the East Gate site to improve its aesthetic appearance and the new Spring Creek site should be shielded from motorists and persons using the river. The Church said:

East Gate Site. This site was chosen because it is immediately adjacent to existing development at Corwin Springs and because it is largely shielded from the view of passing cars along Highway 89 by a bank or natural earth berm immediately adjacent to the road. Very few existing neighbors will even be able to see the new buildings. Trees and willows along the Yellowstone River will shield most of the development from the view of floaters and fishermen.

Spring Creek Site. This site is similarly shielded from view from the highway and the east side of the river by a large ridge or natural earth berm on the high west bank of the river, immediately to the east of the building sites. This berm is approximately 30 feet higher than the land proposed for development, and the highway is about 30 feet lower. Visitors to the Devils Slide viewpoint along the highway and floaters and fisherman on the river will not be able to see the development at all. Cars driving along the highway will only have a brief glimpse of the site as they head north from Gardiner.

While many of the buildings to be used on the sites will be "modular" dwellings and offices, plans are to finish them with wood or paneled siding and mansard roofs to give an attractive rustic effect....

The overall design of the buildings, exterior finishes, landscaping and site layout is in a rural village atmosphere, consistent with the aesthetic characteristics of the area. (See Drawings 1 and 2)

The Church has also placed 4 dwellings in the Mol Heron Creek drainage.

As for future development in the Corwin Springs - RTR-S area, it appears it will take place at 1 of the 3 existing sites or at Spring Creek. There is no indication from the Church that it will (a) begin deviating from a clustered dwelling approach or (b) move from the previously mentioned areas--particularly since both Spring Creek and the Headquarters seem to have ample room for future expansion.

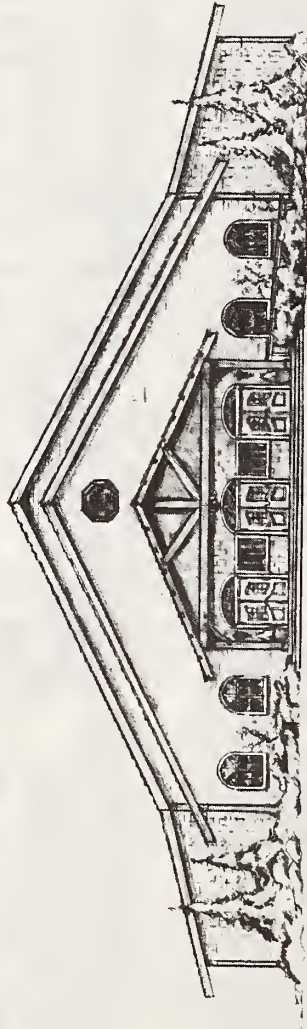
Certainly the urban appearance of East Gate and the Headquarters areas have changed the aesthetic qualities for persons living in the area and for those traveling along the highway and river. It appears Spring Creek will be adequately shielded and the Ranch Office still retains the outward qualities of being a working ranch.

The Church did have the initial option to divide its property into small acreages and house its members accordingly; however it chose to use a clustered or grouped approach, providing more open-space for agricultural purposes and retaining greater aesthetic qualities.

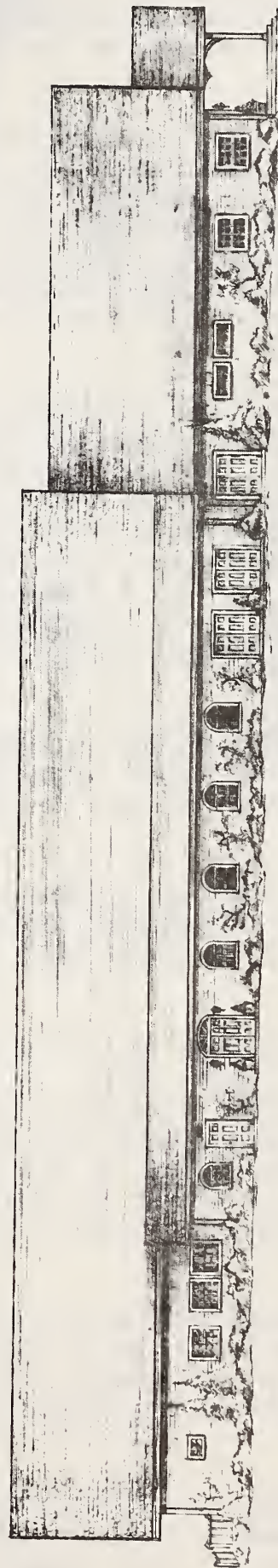
SPRING CREEK H.Q. SITE



SPRING CREEK H.Q. CHURCH



NORTH ELEVATION



EAST ELEVATION

AIR QUALITY

The main air quality concern is the impact of fugitive dust from construction activities as well as the fugitive dust generated by extra traffic on dirt roads in the area. Fugitive dust from construction is considered a temporary source since emissions usually cease when construction and landscaping activities are complete. Temporary control using water spray trucks during construction is usually adequate for this type of emission.

Fugitive dust from traffic on gravel surfaced roads can be a long-term problem and needs to be addressed by the community. The DHES's Air Quality Bureau (AOB) continues to encourage the development of special or rural improvement districts to pay for road maintenance and dust control in rural subdivisions. The Church's application states it will apply an environmentally approved dust suppressant to roads on the development site and it will be willing to pay its share for maintenance of the county road system. The gravel crusher currently operated by the Church has been permitted by the AOB.

Another air quality concern is smoke from residential wood burning in the area. The application mentioned 2 wood-fired boilers used for heating, as well as 2 or 3 fireplaces or wood burning stoves. The boilers are small enough so that no air quality permit is required for their use. Also, there are no current requirements on residential wood stove emissions; however, a federal requirement on new wood stoves is expected to be effective by July 1988.

One other air quality concern is the fact that the Church's property borders YNP. This is a mandatory Class I area for air quality and maximum allowable increases over the baseline concentrations for particulate are:

5 ug/m₃ annual geometric mean
10 ug/m₃ twenty-four hour maximum

Since temporary construction emissions are exempt from increment consumption and the Church's application addresses controls for dirt or gravel roads, it is highly unlikely that the above limits will be exceeded at the park boundary. However, this should be carefully monitored if development continues close to the border of the park.

UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES

The RTR-S is situated in an area that has a number of unique environmental resources. Some of these have already been discussed, such as the grizzly bear, bald eagles and bighorn sheep (see Terrestrial and Aquatic Life and Habitats); a discussion of the Church's conference site in the Mol Heron Drainage (see Vegetation Quality, Quantity and Distribution); the historical and archaeological sites on or adjacent to the property (see Historical and Archaeological Sites) and La Duke Hot Spring (see Historical and Archaeological Sites for a discussion of the historical significance of the hot springs).

LA DUKE HOT SPRING - GEOTHERMAL CONSIDERATIONS

La Duke Hot Spring was the hot water source for Corwin Hot Springs, a 72-room hotel, health spa and plunge built around the turn of the century at Corwin Springs. The geothermal source was a mile and a half south of the spa. The plunge operated on and off until after World War II, when it was permanently closed.

When the Church purchased the Corwin Springs property, it became owner of all of the water rights to the hot spring. These rights had first been appropriated for use in 1899--predating the expansion of Yellowstone Park into Montana by more than 30 years. And, pursuant to the water rights adjudication process currently taking place in Montana, timely filings were made for all of these existing rights--including claims for prior uses of hot water for commercial, irrigation, domestic and recreational purposes. These include a total of 11.6 cfs which have now been preliminarily decreed by the water court.

Under the adjudication law, any claimants, including state and federal agencies, are allowed a certain period of time to file objections after the publication of the preliminary decree by the water court for each drainage basin. While some of the claims on La Duke Hot Spring were objected to by government agencies, the two primary commercial use claims with the earliest priority dates--totaling 5.0 cfs, or approximately 2,250 gallons per minute (gpm)--were not challenged.

Since 1981, the Church studied various methods to reinstall a new pipeline from La Duke Hot Spring to its Corwin Springs developments. It appeared the project would not only be costly, but also unsightly and disruptive, since the route would have been along a fairly steep and narrow strip between mountain slopes and the Yellowstone River--most of which is now occupied by an expanded U.S. Highway 89, which did not exist when the original pipeline was laid.

An alternative was to drill a well on the west side of the river and use the water at the Spring Creek site, rather than at Corwin Springs. This was a distance of only several hundred feet to the place of use, versus a mile and a half downriver to Corwin Springs.

According to Montana Water Law, a permit from the State Department of Natural Resources and Conservation (DNRC) could be obtained to change the point of diversion and the place of use for an existing water right. The Church drilled an exploratory well in April 1986 on the west side of the Yellowstone River, a total distance of 728 feet from the present La Duke Hot Spring point of discharge, to intercept the spring flow on the other side of the river. The effort proved successful.

The well was drilled through a hard clay formation to a total depth of 458 feet, with the hot water first encountered at about 400 feet. Since the aquifer is confined at this point by the impervious clay above it, the static water level in the well casing came up to within 40 feet of the surface--or about the same elevation as the La Duke Spring point of discharge across the river. The well was pump tested by the driller at 600 gpm for several hours to clean up the aquifer and to get a preliminary idea of

its capacity, and then it was capped. Except for brief periods of testing it has remained capped to the present.

The site chosen for the new headquarters is right next to the previous townsite of Electric, where upwards to a thousand people lived in 1910, and also only several hundred feet from the new well. Consequently, the Church decided to further investigate the possibility of using the hot water in this area and to proceed with a hydrological study and evaluation.

The firm of Hydrometrics was chosen to perform this work. Hydrometrics is a Helena, Montana, consulting firm. The purpose of the study was (1) To investigate the possible connection between the well and the existing discharge at La Duke Hot Spring, and to determine whether they should in fact be the subject of the same water rights and (2) To evaluate the potential for any adverse impacts to Yellowstone Park geothermal features from the Church's use of the well.

Concurrently with that study, the DHES decided in the fall of 1986 to prepare an EIS based on the new developments proposed by the Church. Included in the state investigations was an examination of the La Duke Hot Spring well and any possible impacts on Yellowstone National Park's geothermal features.

The first phase of the study by Hydrometrics included an "aquifer test" conducted on the well and the hot spring together. This involved taking temperature measurements, collecting water samples for lab analysis and pumping and monitoring flows over an extended period. Also undertaken was a review of existing literature and scientific information available concerning La Duke Hot Spring and the hydrogeological systems of Yellowstone Park.

The results of these investigations were issued in a report dated December 23, 1986. According to the report, the aquifer test showed conclusively that "...the aquifer penetrated by the thermal well also is the source of water for La Duke Hot Spring." The factors cited for this conclusion were (1) very similar water quality as evidenced by laboratory analysis of samples taken from both the spring and the well, (2) identical water temperatures at 57° C (which converts to about 138° F), (3) a static water level in the well that is within 5 feet of the elevation of the spring point of discharge, and (4) a direct correlation between pumping of the well and the spring discharge (i.e., when the well was pumped spring flows declined, and when pumping stopped spring flows were soon restored).

An important aspect of this data was to establish that the Church's thermal well involved the use of an existing natural discharge at La Duke Hot Spring that has historical commercial uses to which the Church owns the water rights and that a new and previously unused geothermal water source was not involved.

As for potential impacts to any Yellowstone Park geothermal features, the study was less definitive, primarily due to the lack of hydrogeological knowledge about the park's geothermal systems. However, several technical considerations were identified by the consultant which indicated there should be no impact to park resources from pumping the well at the historical levels of spring discharge.

These included the large distance and difference in elevation from the nearest park geothermal features (about 9 miles to Mammoth Hot Springs), the geologic diversity and lack of hydraulic continuity between the park and the La Duke Hot Spring area, and the fact that the discharge near Corwin Springs is significantly downgradient rather than upgradient from all of the park features.

The report cited the historical level of discharge had been estimated to be in the range of 400-500 gpm, and the conclusions were conditioned on that level of use. The estimate was based upon data obtained from the U.S. Geological Survey Water Resources Data for Montana which showed a measurement in 1972 of 500 gpm, which flow rate had been corroborated by the former owner who had made several private measurements. However, the accuracy of these measurements has since been questioned, and some concern has been expressed that pumping at 500 gpm could in effect overuse the aquifer and possibly cause some draining effect on Yellowstone geothermal systems, should a hydrological connection exist.

A representative of the Church, in testimony before the U.S. Senate Subcommittee on Mineral Resource Development and Production on July 14, 1987, in Washington, D.C., stated:

What is important to realize is that we have never proposed or intended to use any more water from our well than the naturally occurring discharge at LaDuke Hot Spring to which it is directly connected, whatever the actual level of that natural discharge might turn out to be. If 500 gpm does not turn out to be the actual figure but instead a lower one is more accurate, then the lower one would be chosen as our upper limit. The hydrologic principle here is that if no more than the naturally occurring discharge is withdrawn, there cannot be a resulting impact to the aquifer--it would be a physical impossibility. What is still being looked at is the mechanics of how this can be accurately quantified and accomplished.

In January 1987, our position was set forth in a letter to Yellowstone National Park Superintendent Robert D. Barbee, together with a copy of our consultant's report. In that letter I stated as follows:

"I also wish to reiterate the substance of our former conversations and correspondence, wherein I have informed you that we have no plans to undertake any further geothermal drilling in the area in the future and that we have pledged that if any detrimental impacts on Park geothermal features occur which are attributable to our use of the well, we will stop pumping."

Another professional perspective on the subject was put forth in a report prepared in March 1987 by John L. Sonderegger of the Montana Bureau of Mines and Geology. This report was prepared at the request of two state agencies involved in the Church's EIS. Sonderegger states that the question of whether Mammoth Hot Springs in Yellowstone Park is hydrologically connected to La Duke Hot Spring cannot be definitely answered; however, he postulates how the various geothermal discharges could represent one large

system. This is in disagreement with the geological interpretation mapped by Struhsacker (1976), Ruppel (1972), Fraser and others (1969) relied upon by the Hydrometrics analysis.

Sonderegger's report also raises the question concerning the accuracy of the 500 gpm USGS measurement in 1972, pointing out that there are no measurement notes in the file to support that discharge value. The implication is that a lower figure in the range of 130-220 gpm, as documented by other USGS measurements, is likely more accurate. However, while most of the theories about geology, hydrology and past flow measurements--by all parties--remain debatable, one of the report's most significant contributions is in the presentation of a best case/worst case analysis.

Best Case

In this case the conclusions presented by Hydrometrics in their analysis are valid. Little or no impact from developing 400 to 500 gpm at La Duke would be noted in the park. This presumes that apparent hydrologic isolation is maintained under the hydrologic stress of removing as much as 210 to 263 million gallons (644 to 807 acre-feet) of thermal water per year at the La Duke well. This would constitute the capture of thermal water currently discharging along the Gardiner fault zone and any enhanced discharge would be compensated for by increased flow from a more northerly source than Mammoth thermal waters, of a low chloride content. An aerial, thermal-infrared imagery survey of the Yellowstone Rivers in the La Duke vicinity might permit an estimate of thermal discharge.

Worst Case

In this case the most scenic park feature related to the carbonate system (Mammoth Hot Springs) is isolated from the Hot River discharge and Mammoth waters are discharged along the Gardiner fault where it intersects with the Reese Creek fault--in the vicinity of La Duke Hot Spring. Initially only about one third of the pumped water comes from the Mammoth discharge, but, as pumping effects expand, a greater proportion of the water withdrawn comes from the Mammoth sector, and pressures decline causing some of the Mammoth springs to cease flowing.

This is feasible in a confined system. Geothermal aquifer testing in the Little Bitterroot Valley produced 0.1 ft of draw-down in a well 12 miles from the pumping point for a test that lasted 68 hours with an average production rate of 1400 gpm (Donovan, oral comm., 1987).

Assuming the worst case scenario to be true, Sonderegger's analysis offers a way of preventing any such impacts while still allowing the use of the well. The report states:

CONCLUDING OBSERVATIONS

Because scenic features of a national park are potentially at

risk, it would seem prudent to limit geothermal production in some manner and to assume, a priori, that any diminution of geothermal features with the Park's Mammoth area is a result of pumpage at La Duke. This would necessitate that the Park Service instrument, either for pressure or discharge measurements, or some of both, the Mammoth and Hot River springs. Additionally, limitations could be placed upon production at La Duke, by requiring that pumpage be adjusted such that the original "point of diversion", LaDuke Hot Spring, maintains a small but measurable flow and that the chloride content of the thermal well water not exceed 50 mg/L (a value 25% greater than that reported for the well).

Limiting withdrawals from the existing well to the yield which does not quite dry up the La Duke Spring is particularly appealing because of its simplicity. It would require periodic sampling to verify that the spring is still yielding geothermal water, but it is a simple way to insure that excessive pressure reductions due to pumping do not occur. Additionally, while it will probably result in the production of a larger quantity of geothermal water than was discharging from the spring, it ties the production limit to the original point of diversion and all claims on that source.

In the next development, Yellowstone National Park issued comments in May 1987 on the Hydrometrics report which admits that La Duke Hot Spring and the well drilled by the Church intercept the same aquifer, but also supports the "worst case" analysis postulated by Sonderegger that a hydrologic and/or geologic connection could exist between La Duke Hot Spring and Yellowstone Park's geothermal systems. It, too, questions the 1972, 500-gpm measurement. On that point, Yellowstone Superintendent Bob Barbee's letter concludes:

In your [the Church's] letter and in other public statements you have said that as long as you did not pump more water than naturally flows from La Duke Spring, the aquifer could not be damaged. If we assume you were correct in that reasoning, then the issue of the spring's output becomes critical.

In light of Superintendent Barbee's letter, and to gather data on actual discharges occurring at La Duke Hot Spring and begin to determine what level of pumping can safely be sustained from the well to stay within Sonderegger's guidelines, further testing of the spring was undertaken by Hydrometrics in June of 1987.

Based on information from a draft hydrological report submitted to the Senate Subcommittee, the Church stated:

Thus it appears that the naturally occurring discharge from La Duke Hot Spring is in the range of at least 130-220 gpm as previously measured and reported, plus additional flows occurring in a zone around the main spring reservoir and under the Yellowstone River. Further testing of both the well and the spring will have to be performed to more precisely quantify the existing natural discharge before any definite magnitude of use can be

planned for the water by the Church. It appears at this point, however, that the figure will be less than the 400-500 gpm previously estimated.

In its testimony, the Church went on to state that at this point it is still in the investigation and research stage and does not anticipate "moving forward" until the EIS is concluded. It has not applied to DNRC for a permit to change the point of diversion and the place of use--a process that will itself involve further environmental evaluation and public hearings, and will likely take from 6 months to a year to complete.

Until that process is concluded and a permit issued, no substantial use can be made of the hot spring water at the well other than necessary testing.

In its testimony the Church discussed some of the possible uses of the heated water:

Due to all of the uncertainties...no firm decisions have been reached...concerning the ultimate uses of this water. We have only general plans and ideas at this time, and these include the following:

1. Heating of one to three buildings, but certainly not of all of the buildings planned for construction at the Church's proposed headquarters location. This would best be accomplished by transferring heat to non-mineralized water in a sealed system through a heat exchanger and recirculating this heated water through concrete floor slabs. Only a small fraction of the planned buildings could conceivably be heated from 138° F water supplied at 200 gpm, if that's what the allowable flow turns out to be. And only a few of our buildings will have concrete slabs.

2. After the water has been partially cooled to about 110°-125° F from heating buildings, it could then be used in a hot spring pool or health spa. This would not involve the withdrawal of any additional water from the aquifer, but would use the same water previously used for the building heat.

3. Greenhouse heating or other agricultural applications might follow the building heat and/or pool use, probably at temperatures below 100° F. Again, this would involve the same water previously used and no new water would need to be withdrawn from the aquifer.

4. Winter use would likely be much higher than summer use. And day use would likely be higher than night use. This could be evened out somewhat by constructing a storage reservoir similar to what is already in place at the present Hot Spring discharge site.

5. Implementation of these projects would probably take place over a 2-5 year period. Beyond this, we have no further plans at this time, and certainly no plans for any further geothermal production.

6. Also being investigated is the possibility of reinjecting the water back into the aquifer after heat is withdrawn in order to maintain the flows at La Duke Hot Spring nearer to current levels. If successful, the use at the well might in fact qualify as a "non-consumptive" use. (The above comment was received subsequent to subcommittee testimony.)

DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR AND ENERGY

The environmental resource most directly affected in the purchase of the RTR-S property by the Church is land.

Land-use can be directly influenced by the landowner and local government, which has the ability to lead community planning efforts. However, in the case of RTR-S two other influential factors have been added to the questions of land-use considerations, they are the FS and the NPS. Both, being controllers of substantial portions of national land, have become involved with proposed uses of land adjacent to Church property.

Part of the heightened awareness concerning land-use evolved because the Church tends to be more conscientious about administering its lands than one of the former owners of RTR-S land, Malcom Forbes. Under that ownership, there were only a handful of people managing the property, with no apparent efforts to control use of the private land by the public. In effect, it became de facto public land.

Since the Church became the owner, access has become strictly controlled. Using RTR-S land has become similar to accessing much of the private land in Montana. Permission must be obtained from ranch personnel. The Church does not allow some activities, such as hunting in some specially designated areas. Although the change in management attitude is not uncommon, it is difficult for some to accept.

There have also been differences between the Church and government agencies.

A locked gate blocking vehicle access to the upper part of the Mol Heron Drainage was an issue the Church inherited from previous owners.

The FS has proposed managing the upper reaches of the drainage for recreation, grizzly bear habitat and livestock grazing. The federal agency did have an option to purchase the ranch in 1980, but let it lapse.

According to the Church, one of the prime reasons for purchasing the property was the aesthetic retreat-like quality of the Mol Heron drainage. These qualities were tied to its spiritual beliefs. When the FS was not able to secure the funding to buy the ranch, the Church made an offer and eventually negotiated a purchase price.

Several gates had been locked by owners of the ranch in the 1960s. The dispute eventually found its way to the Montana Supreme Court, which determined that the Mol Heron Road was a public county road up to the point of the present locked gate, but was private from there on. Subsequent owners, including the Church, have kept the gate locked. Forest Service attempts to open the area for recreational use have been met with opposition.

Since the Corwin Springs-Gardiner area is an attractive recreational area, the FS decided in 1983 to explore options for gaining access to national forest land in which the access is now controlled by private individuals. After receiving comments from property owners and persons interested in gaining access, the Forest Service has been developing an EIS to analyze possible courses of action. Included in these possibilities is a proposed land exchange between the Church and the FS.

The proposal would essentially exchange all the national forest land currently within the boundary of the RTR-S holdings from Cinnabar Mountain south, for Church property north, east and west of the Trestle Ranch, including the OTO Ranch and Cutler Lake.

According to the Forest Service, the draft EIS addressing access possibilities in the West Gardiner area--including the proposed exchange with the Church--will be available for public review near the end of 1987 or first part of 1988.

The historical use of Reese Creek for agricultural irrigation is another demand on an environmental resource. With the purchase of the ranch, the Church continued to exercise the use of existing water-rights on Reese Creek. There are two other water users downstream from the Church's withdrawals, but both are substantially smaller.

Due to irrigation demands, the lower part of Reese Creek has been occasionally dewatered. The Church and NPS are negotiating the possibility of sustaining a minimum flow for fish and other aquatic life.

HISTORICAL AND ARCHAEOLOGICAL SITES

Due to the interest concerning the many historical and archaeological sites in the upper Yellowstone River Valley, including Paradise Valley, the DHES asked the Church to provide professional studies addressing both subjects. The Church hired GCM Services, Inc., private consultants from Butte, Montana, to do the research and prepare a report.

GCM Services' report included a literature search, field verification of existing sites and field inspection of the Church's construction and high-use areas. It referenced known and discovered sites by location. Due to the details of the studies, the Church will be able to use the information when considering planned and future development.

Concerning the specific locations of archaeological sites, the State of Montana keeps this information confidential, with access to the information provided upon request by the State Historic Preservation Office. This means of security prevents unqualified persons from having access to the fragile sites.

The following is from the GCM report:

PREHISTORY

The general background for the prehistory of the upper Yellowstone Valley must be described by examining sites from mountain regions of western Montana and Wyoming and eastern Idaho. The landscape provides high mountains and foothills, intermountain valleys and parklands. Early man was able to adapt to these different habitats and changing climatic conditions over time...

PALEO-INDIAN PERIOD (12,000 - 5500 B.C.)

Man's presence in the mountains, valleys and high plains of southwestern Montana and northern Wyoming can be documented by a number of archaeological sites. Projectile points from this period were large lanceolate spear points used to hunt the large Pleistocene fauna, e.g., mammoth, bison, camel. These include the fluted Clovis and Folsom points reported in Beaverhead and Madison counties (Jasmann 1963) as well as other parts of Montana and Wyoming. As the large game animals began to disappear around 8000 B.C. early man adapted more to a hunting and gathering method of subsistence (Frison 1978). Different ecological zones were utilized and the upper Yellowstone Valley was intermittently occupied during this time....

During the later part of this period the climate became warmer affecting vegetative and animal communities. This caused early man to use not only hunting but more gathering of vegetable plants as a means of subsistence. The foothills, mountains and intermountain valleys were used as well as the plains. More sites began to appear at higher elevations as man spread into other ecological zones. As many as 150 sites at an elevation of 9000 ft. or higher have been located in the Absaroka Range (Haines 1963)....

EARLY PLAINS ARCHAIC (5500 - 2500 B.C.)

During this period the climate continued to be warm and the glaciers retreated. This enabled early man to exploit the surrounding environment more effectively by moving into the foothills, mountains and intermountain valleys. More vegetation in these areas meant more food resources and the archaeological record suggests seasonal migrations into the higher elevations in the summer months became common. With the large Pleistocene fauna disappearing, the gathering of vegetable material became even more important. Sites from this time frame show a general decrease in hunting tools and more manos (hand) and metates (stones for grinding) along with large, stone filled fire pits which may have been used for roasting....

MIDDLE PLAINS ARCHAIC (2500 - 1000 B.C.)

...Sites from this period occur frequently and can be found

from the plains to the mountains and in places where sites from earlier time periods were not known. Sites of this time period along the upper end of the valley near Gardiner tend to be small in size. However, sites north along the drainage in the lower elevations near Livingston are larger. Many sites around Bozeman and Helena in the intermountain broader and lower valleys were considerably larger in size, suggesting larger groups of people living together.

LATE PLAINS ARCHAIC (1000 B.C. - A.D. 200)

Climate on the plains during the Late Plains Archaic is characterized by a cooler and moister time, which may have caused an increase in vegetation. The number and size of sites documented from this time are numerous and suggest a significant population increase. Bison herds increased and the traps used to capture them became more common. The most common point type is a corner-notched variety known as Pelican Lake which has wide, open notches that form sharp points. Sites in the upper Yellowstone that have Pelican Lake levels are the Small Emigrant Kill, Myers-Hindman, Eagle Creek and the Sphinx site (Frison 1978).

Towards the end of the Late Plains Archaic a different projectile point appeared known as Besant. This appeared in the form of large, side-notched, dart-like points and a few corner-notched points. Corrals made of logs with posts were being used to capture the bison and there is evidence of extensive religious activity in association with some of these sites. Frison (1978) suggests that the hunters using the Besant technology practiced a very sophisticated form of bison hunting (Frison 1978).

LATE PREHISTORIC PERIOD (A.D. 200 - 1700)

The size and number of sites continue to show an increase in population. The atlatl (a sharp-pointed throwing stick) was replaced by the bow and arrow as the primary hunting tool. As a result, projectile points become smaller and different manufacturing techniques were adopted....

Pottery begins to be used with the Intermountain pottery tradition being most common in the upper Yellowstone. It has been associated with Shoshonean groups (Mulloy 1958). Steatite bowls are also reported at this time at sites in Wyoming and Montana (Frison 1978). Other intrusive pottery types that have been noted in the area are Mandan tradition and Crow pottery styles (Frison 1976).

During the Late Prehistoric, the use of obsidian for tools increased in the upper Yellowstone. As one moved away from the park and the obsidian source the choice of material tended to be what was locally available. Other diagnostic tools of this period are the grooved maul and the bison metatarsal flesher.

Sites in the upper Yellowstone that are representative of the

Late Prehistoric period are the Six Mile, Sphinx site, Eagle Creek, Large Emigrant Kill and the Myers-Hindman site (Lahren 1971). Near Daily Lake there are several occupation sites that date to this period. These sites are near the end of the "High Trail" which was used by Indians and early trappers to avoid the dangers of Yankee Jim Canyon.

PROTOHISTORIC PERIOD (A.D. 1700 - 1800)

The introduction of the horse to the Indians on the Northwestern Plains brought about dramatic cultural changes. The horse enabled the Indians to cover more area and brought about new hunting techniques. With the horse replacing the dog in transporting camp belongings, moving was easier and more items could be carried.

European trade goods in the form of beads, iron knives, metal points and brass items were introduced to the Indians at this time. The Brawner Burial located in the upper Yellowstone contained a skeleton covered with trade goods (Lahren 1971).

Several Indian groups inhabited southcentral Montana during historic times. These include the Blackfoot, Crow and Shoshoni. The Blackfoot tended to stay north of the Yellowstone River and ranged as far east as the Musselshell River (Haines 1977). The Crow occupied land from the Yellowstone River south into Wyoming and as far east as Powder River (Haines 1977). The Shoshoni were situated in the southern part of Montana and occupied country from the Absaroka range west to Oregon and as far south as northern Nevada and Utah (Haines 1977). It is probable that all of these groups passed through the Paradise Valley commonly. The Tukudika Shoshone or Sheepstealers commonly lived in the area of Yellowstone Park and in relatively remote areas. Their camps are known from the park and from high mountain country of the Pryors and Bighorns to the east.

HISTORIC BACKGROUND OF THE UPPER YELLOWSTONE

TRAPPERS, HUNTERS AND EARLY SCIENTISTS

The region north of the project area was first visited by Euro-Americans when the Lewis and Clark Expedition passed through on its way from the Pacific Coast to St. Louis. Although none of the expedition's members explored the upper Yellowstone Valley, John Colter, who was with the party, would later be one of the first white men to see the natural wonders of what would become Yellowstone Park. Colter returned to the Yellowstone area in the fall of 1807 to solicit business from the Indians for Manuel Lisa's Missouri Fur Trading Company. Colter's exact route is not clear and although he was very likely the first white man to visit the Yellowstone Park area, it does not appear he traveled through the upper Yellowstone....

Undoubtedly other fur trappers followed Colter into the

region during the succeeding years, but they left few records. The war of 1812 interrupted the development of American fur trading companies in the region. The few trappers who were able to penetrate the area following the war were under constant harassment and attack from the Blackfeet Indians who dominated the region until the 1837 smallpox epidemic decimated the Indian population to such a point they ceased to be a threat. Among the few trappers who are known to have visited the upper Yellowstone area was Joe Meek, whose party was attacked by Blackfeet Indians near Devils Slide on the Yellowstone River in 1829. Two of the trappers were killed and the remainder were scattered, including Meek who ended up in Yellowstone Park where he was rescued days later.

Another early visitor was Warren Angus Ferris who was the first to use the term "geyser" in describing Yellowstone's features. Johnson Gardner probably trapped the area in 1830 and 1831 as did Jim Bridger and Thomas Fitzpatrick in 1832. One of the few trappers who wrote down his impressions and observations was Osborne Russel who trapped in the region from 1834 to 1843 and visited the upper Yellowstone area a number of times between 1834 and 1839. He was one of the few early trappers to write about his experiences and he left a vivid and descriptive account of frontier life during this period.

The trappers made no permanent impression on the area--except for virtually wiping out the beaver population. It was not until the 1860s when a large influx of whites arrived as part of the mining boom and established the first settlements [sic]. Placer gold discoveries at Grasshopper Creek in July of 1862 started the rush. Subsequent strikes at Montana City, Alder Gulch, Last Chance Gulch and Confederate Gulch lured thousands of miners into the Montana territory. In the fall of 1863, Thomas Curry discovered gold near Emigrant Gulch and by the next year the first settlement in the upper Yellowstone had been built around the placer diggings. Other prospecting groups also searched the area at this time, such as the expedition led by Colonel DeLacy which prospected parts of Yellowstone Park.

In addition to prospectors, attempts were made to organize "scientific" expeditions to study the park's wonders. Some of these early groups were still primarily interested in mineral discoveries, but others were interested in scientific study or just curious about the natural wonders of the park. One such group was organized by acting territorial Governor Thomas Meagher in 1867. However, his sudden drowning death resulted in the expedition degenerating to little more than a scouting trip which got no further than the hot springs at Mammoth.

Another attempt to organize a major expedition to the area got underway in 1868, but the promised military escort was called elsewhere and just three men - Charles Cook, David Folsom and William Peterson - traveled through the upper Yellowstone on their way to the park. Better organized groups such as N.P. Langford's

party, which included Henry Ashburn, Truman Everts and Samuel Hauser, toured the area in 1870. Lieutenant G.C. Doane, who lead the group's military escort, wrote the first official government report on the area and was one of the first to note the area's coal deposits.

Dr. F.V. Hayden made two trips to the park in 1871 and 1872 and was the first to thoroughly survey the region. In addition, he brought artists Thomas Moran and Henry Elliott, photographer William Jackson as well as an entomologist, two topographers, a meteorologist, two botanists, a mineralogist and a zoologist. The publicity resulting from Hayden's expeditions was instrumental in Yellowstone being officially declared a national park by Congress on March 1, 1872. Although increasing numbers of tourists would visit the park in the succeeding years, the predominant activity in the upper Yellowstone Valley would be centered on mining.

HARD ROCK MINING IN THE AREA

Following the placer discovery at Emigrant Gulch, other strikes were made in the area. In 1864 the Phelps-Davis party of prospectors were heading for Emigrant Gulch after prospecting Yellowstone Park. George Phelps, leader of the group, reported the discovery of gold near present-day Gardiner. Also in that same year another group led by George A. Huston discovered traces of gold at Bear Creek where it meets the Yellowstone just upstream from Gardiner. Two years later "Uncle" Joe Brown recovered \$1800 in gold at this same location during the month of May. Brown and three other men claimed the entire bar and by the end of the season had taken out \$8000 in gold. At this time Lou Anderson made another good strike at Crevise Creek a few miles up river from Bear Creek. In 1870 gold quartz veins were discovered further upstream on Bear Creek at the future site of Jardine. During this same period other potentially rich deposits were found near the site of Cooke City by trappers who were fleeing from Indians. Shortly after base camps were established at both locations while additional mineral discoveries were made in the Crevass and Goose Lake districts.

Both areas experienced similar, and typical, patterns of discovery followed by promotion and development. After the initial boom period the mines usually failed to meet the high expectations and were shut down, went into receivership and then were reorganized. Early development of both areas suffered from prohibitive freight rates and the Cooke City area was further handicapped by being on Crow Indian land until 1882 when it was withdrawn and opened to settlement.

The Jardine district became the economic mainstay of the area and remained relatively active following the initial lode discoveries although there were two extended periods when the mines were closed from 1909 to 1916 and from 1926 to 1932. Extensive mill facilities were built at Jardine and in 1904 a cyanide plant was added, followed by flotation equipment in 1922. Peak periods

of production were during the early 1920s and just before the outbreak of World War II. In 1942 the government restrictions on gold mining closed the mines. However, a war-time need for arsenic led to the reopening of the Jardine facilities which remained in operation until 1948 when the cyanide plant burned down, bringing to an end the active mining operations at Jardine.

Mining activities around Cooke City lagged behind Jardine because of continuing difficulties with transportation and the inability of Cooke City promoters to induce the railroad to build a branch line through the park to the mining camp. Some operations, however, such as the Imma property on Republic Mountain became a small but consistent producer of lead and zinc. The McLaren Gold Mines Company had extensive claims on Red Mountain which were developed during the 1930s. A large concentrator was built and the operation became an important gold-copper producer but, in general, the New World district around Cooke City never fulfilled its initial promise.

THE COAL DEVELOPMENT

The area also had perhaps the finest quality coal seams in Montana, but here again, the development of these seams failed to meet initial expectations. During its short life span, the upper Yellowstone coal field was of equal, if not greater, importance than were the hardrock mines at Jardine and Cooke City. The existence of coal in the area had been known for a number of years before Lieutenant G.C. Doane first reported on it in 1871. The first mines were opened by Joseph and Harry Horr in the early 1880s about three miles downstream from Gardiner. In 1887 the Northern Pacific built a branch line to the mines, and the first shipments of coal were made in the fall of that year. The coal was suitable for coking, and Horace Brown, who had taken over the operation, built 36 ovens in 1888 to convert the coal to coke for the smelters at Anaconda. The coke proved to be of good quality and since it was the only readily available coking coal in the region, it found a large market in Butte, Anaconda, East Helena and Great Falls. Eventually 225 coke ovens were built and additional mines developed. In 1889 J.H. Conrad of Helena bought out Joseph Horr. Conrad became president of the Park Coal and Coke Company which kept the mines running at capacity and began development of the No. 7 seam, which would become the Aldridge Mine.

In spite of the booming conditions at the mines, the company finances were shaky. The panic of 1893 found the company over extended and it went into receivership with the entire operation closed down for a year. The company was reorganized as the Montana Coal and Coke Company and resumed operation.

By 1894 the new mining camp known as Lake had grown up around the mine at the No. 7 seam and the first shipment of coal was made to the coke ovens in January of 1895. Shortly after, however, the miners went on strike which lasted until May. It was finally mediated by company director W.H. Aldridge and in gratitude the

miners renamed the camp Aldridge in his honor. There was to be a history of sporadic strikes and labor troubles throughout the productive period of the coal field. The miners were unionized by the Western Federation of Miners in 1897 and after an initial lockout by the company, a truce was made with the union and company managing to work together for several years.

The coal mining industry of the upper Yellowstone Valley was to have a checkered history for the next decade. At the turn of the century, the prospects of the camp appeared bright. The demand for coke remained high and the mines were operating at capacity. In 1900 an electric power plant was built and electric equipment was introduced to the mines. A 1000-ton per day capacity washer plant was built and construction began for an aerial tramway from the mines to the coke ovens at Horr. Both towns at Aldridge and Horr expanded and were greatly improved by the coming of electricity. At Horr the changes were so pervasive, the town changed its name to Electric in 1904.

In 1902 the East Helena smelter placed an order for 100 tons of coke a day and in 1904 a new vein of coal was found which could produce 1000 tons a day. The company made plans to expand, but then an impasse developed between the union and the company as the miners began to demand a share of the industry's expansion. Just as negotiations were to begin the company locked out the miners, resulting in a strike which was to last nearly a year. Another short strike in December 1906 shut down the mines for a month. After the strike the mines continued to operate at capacity with 225 ovens at Electric producing over 44,000 tons of coke a year. But then abruptly the company was placed in receivership and the mines were closed, as it turned out, for good on June 30, 1910. Mismanagement, labor strife, difficult mining conditions and a decline in the demand for coal and coke were blamed for the closure. Whatever the reasons, the short-lived boom had ended. Most of the population of Aldridge and Horr/Electric moved away and both communities became virtual ghost towns overnight.

After the closing of the mines, the principal industries of the upper Yellowstone Valley reverted to hardrock mining and tourism. The scenery, wildlife and natural wonders of Yellowstone Park acted as a magnet to tourists as soon as they became known. N.P. Langford, the park's first superintendent, made his first official inspection of the park with the 1872 Hayden survey shortly after Congress officially declared Yellowstone a national park on March 1, 1872. However, tourists had preceded even this first inspection tour as the survey party discovered when they encountered about 50 people enjoying the mineral waters at the Mammoth Hot Springs. With the building of the Yellowstone Park Trail, a toll road along the Yellowstone in 1872, and the construction of the Northern Pacific's Park Branch Line to the Cinnabar station in 1883 (and finally completed to Gardiner in 1902), tourists arrived in increasing numbers and have been the mainstay of the area's economy ever since. Numerous dude ranches, motels, restaurants, outfitters and other businesses have con-

tinued to cater to the tourists. The development of Corwin Springs being one of many.

TOURISM

Besides the tourist business, the area's economy has rested on farming and ranching, lumbering, mining activities and work for the railroad. More recently, the area has become the headquarters for the Church Universal and Triumphant with a large developing community located just north of Gardiner. However, given its location at the northern gateway to Yellowstone Park, the upper Yellowstone area's economy will most likely continue to be based on the thousands of tourists who annually travel through the area on their way to or from Yellowstone Park.

FINDINGS AND RECOMMENDATIONS

The Class I literature and records review of the Church's holdings indicated that the area of the North Ranch is not well known archaeologically and that the area historically has been and continues to be agricultural. The small area examined by archaeologists on the North Ranch, the dining hall area, contained no cultural materials. Few historic or prehistoric sites are known although it is estimated that more prehistoric sites exist on the property, but have not been recognized. Similarly, few historic or prehistoric sites are known to be on North or South Glastonbury, areas which have been subdivided into 20-acre tracts. Intensive examination of the crusher site in Lot 52, South Glastonbury, located an old wagon trail presumed to have been used to get to a cabin which was noted on the 1874 government land office (GLO) map.

Although few sites were in the official heritage site records, archaeological site density is high in the Paradise Valley and other archaeological sites of many types can be expected. These could consist of surface and subsurface lithic stone fragment scatters, stone circles, cairn alignments, which may or may not lead to a kill site, plus other prehistoric manifestations. Such sites can be expected primarily, although not exclusively, along flat terraces of the rivers and streams and along the edges of higher terraces.

The South Ranch...contains a wealth of history. In this area the tourist trade, the hot springs, the coal mines and associated towns and structures, the transportation routes and the agricultural activity provide a colorful and relatively long and extensive past. The mines at Aldridge and behind the old town of Electric have been recorded for the Abandoned Mine Reclamation Program administered by the Montana Department of State Lands.... Inventory for a proposed transmission line corridor has been initiated by the Montana Power Company and will be completed in 1988 (Huppe 1987). These two documents will provide even more extensive information on the area's history and prehistory.

Five locations on the South Ranch were selected for intensive cultural resource inventory (Class III). These locations have had or will have extensive development and surface alterations. One area, the Retreat...[was inventoried later]...because of weather conditions. On these intensively examined areas, three prehistoric sites and three historic sites were recorded. The historic sites were all considered to be significant in terms of the criteria established by the National Register of Historic Places (NRHP). Two of the prehistoric sites contained buried components and have the potential to add further information to the local prehistory and are also recommended as eligible to the NRHP.

The East Gate site, a subsurface prehistoric location, has received impact from historic construction of the plunge, from past cultivation and from recent development by the Church. However, much of the site is still intact. Additional work by the Church at this location will be to excavate and place one additional sewer line to the drainfield and to replace the topsoil. Examination of the open trenches in the area of the proposed sewer line did not reveal any subsurface cultural materials and excavation of the sewer line should have no effect on the cultural level. Replacement of the topsoil will have minimal effect and will essentially seal the deposit and protect it from further destruction.

Along the lower terrace of Mol Heron Creek near the Trestle Ranch is a buried deposit with lithics and a bone level. This location may represent a kill site or possibly just an intensively occupied camping location. No development is proposed here and it is recommended that this significant site be avoided by future road changes or gravel operations.

The other prehistoric site is small and has no potential to contribute further information to prehistory. It is near the Spring Creek development and will receive no direct disturbance.

The three historic sites are all integral to the historic context of the area. The plunge at Corwin Springs is an example of one of the many spas developed during the late nineteenth and early twentieth century in Montana and elsewhere in the country where hot springs were found. Although never a tremendously successful venture (most such spas were not), this one has a rather unique architectural style, is relatively intact and was associated with a number of persons significant to the local area and to the region. For example, the son of James J. Hill, the railroad magnate, was the second owner of the operation. Plans are to leave the structure alone or possibly to refurbish the pool for use by the local community or for storage of water as a fire reservoir.

Associated with the Corwin Hot Springs site is the bridge which was recorded during the Montana Bridge inventory and it was evaluated as being not significant architecturally. However, the structure is intimately involved in the development of Corwin

Springs and the east side of the river. Consequently, the bridge was evaluated to be historically significant and is recommended as potentially eligible to the NRHP.

Of the numerous roads, trails and railroad lines constructed through the upper Yellowstone Valley, the Yellowstone Park Trail was one of the earlier. It was originally a toll road beginning at Point of Rocks and going to Mammoth Hot Springs. The road served tourists and area occupants from 1871 until 1883 when the Northern Pacific Railroad completed the Park Branch line to Cinnabar. The trail continued to be the only road access to the area until 1924 when the present highway was constructed on the east side of the river. Much of the old trail has been destroyed through development and general agricultural operations but small portions remain. One of these is over the lower slopes of Cinnabar Mountain and just onto the flat land near the Church's proposed sewage lagoon. This section of the trail is complete with a rock showing an advertisement for Hall's Store (which was in Gardiner) and trash along the roadside. The trail as a whole is probably eligible to the NRHP.... The projected impact by construction of the RTR-S lagoon will destroy a small portion of the trail. Although only this small section was examined on this project much of the trail is intact. It is recommended that this impact be viewed as an acceptable adverse effect as it will destroy a portion of the trail but will not impact the advertisement or the trash heaps.

The other historic site is the Pisor residence and Oil House. The residence was constructed in 1901 and has been renovated by the Church. The house has sustained minor alterations through the years, is in a good state of preservation because of the Church's efforts, and is recommended as eligible to the NRHP.... The oil house is constructed of field stone and retains its integrity, however, little is known about it and it does not appear to be eligible to the NRHP. Other outlying buildings in this complex at the Ranch Office are all of relatively recent construction.

GCM was unable to inventory the Retreat area in the upper Mol Heron drainage earlier in the year due to the snow cover. An inventory was done in late summer and although there was evidence of historic and prehistoric activity, it was not significant enough to qualify for nomination to the NRHP. The historic sites recorded were an old corral and the remains of a house that burned. The only prehistoric finds were two stone fragments.

Historic sites on the South Ranch include the remains of the mine at Aldridge, coke ovens, a few remaining structures at the town of Electric, the railroad bed of the Park Branch of the Northern Pacific Railroad completed to Cinnabar in 1883, and other evidence of the coal mining days. Irrigation ditches cross the area and a few are of some antiquity although documentation for irrigation systems in the upper Yellowstone is sketchy. Since many of the buildings and features have been destroyed or removed from the Electric-Aldridge development it is recommended that the

Church allow the remaining structures to deteriorate naturally.

Of the prehistoric sites, there are many known to be on the South Ranch and there are undoubtedly many others not recorded. It is recommended that the Church protect this resource by avoiding the areas during any future development or expanded cultivation of lands. Through the increase in temporary and resident populations at the Church some indirect impact to the archaeological and historic sites can be expected. However, so much of the archaeological resource in the upper Yellowstone Valley has been destroyed by uncontrolled digging it is recommended that the Church discourage uncontrolled digging on these locations. Additionally, it would be helpful if arrowheads or other artifacts collected by ranch personnel or Church members be kept together and the location found marked on the specimen. This effort would greatly assist any future research by archaeologists in the area.

Several archaeological sites of some significance are known to be within sight of the Church developments but outside of the Church property. The Corwin Springs site is an example as it is across the river between Spring Creek development and Corwin Springs. Visual impact to this and other nearby sites from construction of the facilities at Spring Creek will be minimal because of the developments' location on the high terrace of the Yellowstone River.

HUMAN ENVIRONMENT

SOCIAL AND CULTURAL UNIQUENESS AND DIVERSITY

The Church Universal and Triumphant is a socioeconomic force which settled in Park County in the early 1980s and prospered. The reasons for establishing a seemingly urban religious group in a rural area, adjacent to one of the nation's most popular national parks, were both religious and pragmatic. The mountain setting was religiously significant to the Church and the tillable land--purchased along with the rugged terrain--gave the Church the ability to produce much of its own food, thus providing a degree of self-sufficiency.

However, it would be impossible for any large group--religious or otherwise--to locate next to Yellowstone Park and go unnoticed. Friction developed with some government agencies, people living in the Gardiner area and with entities in other parts of the county. Time has eased many of the initial concerns, but the Church remains a source of wonderment and worry for many.

Since the Church Universal and Triumphant's theology has been described as a mixture of eastern and Western mysticism, it creates uncertainty among some nonmembers. Its label by traditional religious groups of being a "cult," also adds to the uneasiness. Also, by its very nature of wishing to be religiously--and to a degree socially--left alone, it sets itself apart from how many rural and urban societies function throughout Montana.

To gain a better insight into how the religion developed, its theology, why it came to Montana, how it was initially received and how it hopes to become part of the social and economic fabric of the Gardiner area and Park County, three separate studies--and comments by the Church--have been incorporated to create a greater degree of understanding. The studies include (1) A paper prepared by William L. Smith, Ph.D., Department of Sociology, Carroll College, Helena, Montana, entitled, "Camelot: Can It Be Recreated in Paradise Valley?" (presented to the Association for the Sociology of Religion Annual Meeting in Chicago, Illinois, August 15, 1987), (2) "The Church Universal and Triumphant," from the Jardine Area Project Existing Socioeconomic Environment - Draft Report, Mountain International, Inc., Helena, Montana (November 1983) and (3) excerpts from J. Gordon Melton's Encyclopedia of American Religions, "Church Universal and Triumphant," Second Edition, 1987.

Dr. Smith's paper establishes a basis for discussing new religions in modern American society:

...Proponents and critics...have battled it out for decades debating whether the institution of religion is declining and what significance this has upon our search for meaning in life. The search for meaning is a perpetual endeavor and one that provides the necessary energy that keeps most religions afloat, and also which provides the dynamics that blossom forth new religions.

We live in an age of religious pluralism. The significance of religion in modern American society is no less vital than it

was for the early pilgrims and settlers of our country. The contemporary strength of religion is evidenced by the growing list of active religious groups. J. Gordon Melton, in his Encyclopedia of American Religions, lists more than 1,300 different religious groups who are presently active in the United States. The "secularization myth" which Andrew Greeley has written about so pervasively over the years, appears to be gaining momentum. The durability of religion is rooted in human nature itself, thus Greeley (1972) and Daniel Bell (1977) and others believe religion will always play a part in the future. Modernization has not destroyed religion. This is evidenced especially in the most developed societies of our world....

There is a large segment of the unchurched population, in our country, who retain their belief in the existence of the supernatural, but the conventional churches have failed, in one way or another, to persuade these people to join up. It is therefore not surprising that a good number of these people would perhaps be willing to examine new religions and their theologies concerning the supernatural and human life.

...Diversity, not unity, is the most salient characteristic of American religion today....Diversity is manifested primarily in the growth among unconventional new religions and quasi-religious groups who [sic] are often referred to by both the media and scholars as "cults." The growth of these new religious groups has produced another round of religious conflict for our country. Many Americans have conveniently forgotten that this is not the first time the United States has experienced religious unrest. Our major churches and denominations have not always lived in harmony with themselves and one another. Catholics, Jews, Mormons, and others have experienced much anguish and turmoil in their battle with the Protestant majority during the early years of the settling of our country. These battles continue somewhat today and the focus appears to be primarily inter-Protestant denominational conflict.

Much of the controversy we are experiencing today concerning the so-called "cults" is a hoax according to Bromley and Shupe (1981:3). Many of these new religions support value systems which are oftentimes very critical of the status quo and in return these new religions are criticized and chastised based primarily upon unreliable data and misinformation.

The anticult movement, fueled by a favorable media and a growing fundamentalism movement, has dominated the discussion concerning these new religions and the anticult allegations concerning brainwashing and deprogramming have received much publicity. While at the same time, there is a growing body of scholarly work which does not support the positions defended by the anticultists.

At this point in time, there appears to be a moratorium concerning these new religions. The American public is not as

captivated by the news clips and allegations. Certainly the Rajneesh episode in Oregon has drawn some attention to the issue of religious pluralism, but by and large the conflict surrounding the new religions has been reduced from a national issue to a regional/local issue....

Gordon Melton's Encyclopedia of American Religions provides a brief outline of the basic tenets of the Church:

The Church Universal and Triumphant is a new activity of the Great White Brotherhood, as the ascended masters are often called (some of the more well known masters include: Confucius, Buddha, Mohammed, the Virgin Mary, Jesus Christ, and Archangel Michael). According to the masters', in the beginning, light came forth from the Great Central Sun, the metaphysical center of our cosmos, and was individualized as many individual sparks, each a personalized fragment of deity. These sparks are the "I AM Presence," the essence of each person. Each person was created a soul destined to return to its source of life. While on earth, the soul can choose to follow a path of return or to wander aimlessly in the mire of existence. Mediating for the soul seeking to return is the Christ consciousness, the real self of each child of God. (Jesus of Nazareth and other very saintly figures walked on earth in complete attunement with their Christ consciousness.)

To assist chelas (students on the path of return), the Church teaches a number of helpful disciplines which include the lost arts of healing and the science of the spoken word. The latter includes prayers, affirmations and decrees to invoke light. Eventually, each soul will unite with its Christ consciousness and ascend, though this process may involve a number of earthly incarnations.

The Church has inherited a strong sense of patriotism and places emphasis upon America's role as the birthplace of modern freedoms in the plans of the masters. Members are also involved in social issues especially as related to abortion, child pornography, nuclear warfare, terrorism, and world communism, all of which the Church opposes.

Individuals may relate to the Church on three levels. Members of the general public may receive Church teachings, participate in most of its religious services and conferences, and send their children to the Montessori school located at the Church's headquarters complex. Next, they may join the Keepers of the Flame Fraternity, in which they pledge to nurture the flame of the inner self. As members, they receive regular lessons, may attend special weekly services and become eligible to attend Summit University. Finally, members of the fraternity may also choose to become full communicant members and be formally baptized. Full Church members must formally subscribe to the tenets of the Church and tithe a portion of their income.

Dr. Smith traces the history of the Church from its beginning in the

late 1950s to the present:

The Church Universal and Triumphant was originally known as Summit Lighthouse. Summit Lighthouse was founded in 1958 by Mark L. Prophet in Washington, D.C. Prophet began to deliver the teachings of the ascended masters...and ultimately...Prophet revealed that he was a new messenger of the Masters and was anointed by the Ascended Master El Morya.

In 1961 he met Elizabeth Clare Wulf who eventually became his student, wife, and the present Church leader. The headquarters of Summit Lighthouse moved to Colorado Springs, Colorado in 1966. On February 26, 1973 Mark Prophet died and Elizabeth took over control of Summit Lighthouse. During the 1970s the organization continued to grow and expand. "Summit University," a non-accredited institution, was founded as was Summit University Press. For a brief period in the early 1970s the Church leased a small ranch in Idaho. In 1974 The Church Universal and Triumphant was incorporated and in 1976 the Church's headquarters was relocated to southern California, first to Pasadena, then to Calabasas which is near Malibu. The Calabasas site was renamed Camelot. The headquarters in both Pasadena and Calabasas were housed in former colleges purchased by the Church. Teaching centers were also established in major cities across the country including New York City, Washington, D.C., Chicago, Minneapolis, and San Francisco. During the 1970s the Church instituted a highly successful Montessori schooling program which today extends through junior high and high school.

The 1970s was also a time of internal conflict and dissension among the believers. Randall King, Prophet's ex-husband, and two other members, Gregory Mull and William Purcell, have brought legal suits against the Church claiming they were threatened with physical harm and were forced to sign over personal finances. Prophet and the Church deny such allegations and have countered-sued. Mull won a \$1.5 million verdict against the Church in the Spring of 1986 (Los Angeles Times, July 5, 1986, Part 1, page 29).

In 1981 the Church purchased a 12,000 acre ranch which was then owned by publisher Malcolm Forbes. The ranch is located in Corwin Springs, Montana just several miles north of Yellowstone National Park. Since 1981 the Church has purchased additional properties bringing its holdings to over 33,000 acres. The Royal Teton Ranch is in reality two separate holdings. The Church owns property south of and in Livingston, Montana....Most of the ranching, cattle, and livestock business is centered there, as is currently the publishing arm of the Church....

The Corwin Springs holdings are the headquarters for the Church. The members who live on the Church properties are staff members for the Church headquarters. There are approximately 400 residents including children who now occupy temporary housing units. There is also a greenhouse at the Corwin Springs headquarters and much of the land there is also farmed. Ed Francis,

Elizabeth Clare Prophet's fourth husband and present vice president of the Church, has indicated that the headquarters has been totally relocated from Calabasas where it was headquartered until late last year and is in full operation in Montana. Francis does not expect the staff to grow by more than 100 more people over the next several years....

Church members reside primarily in single family dwellings and are provided with housing and food, as well as a stipend. The Church also created several housing developments north of the Royal Teton Ranch named Glastonbury North and South. Glastonbury is a covenanted spiritual community. These housing sites are available for purchase by Church members.

At a recent meeting of the Livingston Kiwanis and Rotary clubs, Elizabeth Clare Prophet indicated that her late husband, Mark L. Prophet, told her to take the Church and relocate to Montana because Montana offered the opportunity for the group to live a self-sufficient spiritual lifestyle. Elizabeth, known as Mother by Church members, has stated that the day before Mark Prophet died he related this wish to her. Elizabeth has also stated that she believes the people who inhabit the state of Montana are the kind of people who can be called the "grassroots of America" and therefore Montana would be a fertile place for the coming revolution of a higher consciousness.

The Jardine Area Project Existing Socioeconomic Environment report was prepared by researchers from Mountain International, Inc., of Helena, as part of the assessment for a proposed gold mine development by Homestake Mining Company in the Jardine, Montana area, 5 miles north of Gardiner. Included in this report was an analysis of The Church Universal and Triumphant, which at the time had recently settled in the Corwin Springs area.

Because the report was produced in 1983, some of the situations discussed in it have changed. In an effort to update, and in some instances balance the material, the Church was given an opportunity to read the report and provide its own analysis.

The following excerpts from the socioeconomic report focus on the Church's relationships with non-Church members in the Gardiner area and Park County:

Since establishing its presence in Park County in the fall of 1981, CUT has grown to be the county's second largest private landowner, behind only the Burlington Northern Railroad....In each case, CUT purchased the property through a third party, acting as an intermediary. The scale of CUT's land purchases have been exceeded only by its energy in developing the property. It has filed aliquot subdivisions for much of its land. Twenty-seven hundred acres of the property near Emigrant has been subdivided to 20-acre parcels. CUT announced plans to build a new, self-sufficient community called "Glastonbury" on the site....Local concern over the Glastonbury plan has spawned rumors that CUT plans to move from 1,000 to 5,000 of its members to Park County. The

Church neither confirms nor denies the rumors. On the Royal Teton Ranch, CUT has installed a major irrigation system to support 56 acres of vegetable and fruit production, planted in excess of 300 acres of grain, built two large greenhouses, repaired several bridges and roads, expanded its sheep flock to 1,300 ewes from which it expects to harvest 12,500 pounds of wool, and reopened the Ranch Kitchen restaurant on Highway 89 to serve meals to the traveling public.

In Park County, concern about both the presence and activities of CUT seems almost universal. Public expressions of opposition commonly appear in the Livingston Enterprise, primarily from residents in the Livingston area. There also have been occasions of conflict between the Church, local residents, and governmental officials over issues such as road closures, the development of Park County's master plan, trespass violations, and the like. There has been little violence and no reported injuries in CUT's dealings with the communities of Park County.

CUT's relationship with the people of Park County and various governmental agencies has been dynamic from the outset. It is, therefore, difficult to discern which actions have been provocative and which, reactive. Suffice it to say that both CUT and the local residents feel wronged and threatened by the other.

The community's reaction to CUT can be broadly divided into three classes based on (1) theological, (2) personal, and (3) sociopolitical criteria. In its common form, theological reaction is based on the premise of doctrinal error. That is, a new religious group such as CUT is seen as having misinterpreted or distorted Christian scripture as commonly understood within the Judeo-Christian tradition. "Anti-religious cult" groups such as the Spiritual Counterfeits Project in California and religious leaders frequently employ theological analysis to explain and unmask what they see as deviant religious claims or practices.

Theologically based reactions to CUT in Park County are not particularly evident. Certainly, they are not public to any great extent except for the occasional characterization of CUT as "satanic" or a derivative thereof in the Letters-to-the-Editor column of the Livingston Enterprise. Various church pastors have monitored CUT's activities and have assembled information about it for distribution to their parishioners. The scope and activities of various unconventional religious groups and CUT have assumed a place in most local churches' efforts to educate their flock. Christian ministers interviewed in the Livingston/Gardiner area did not indicate that CUT's presence was correlated with increased church attendance or a deepening of religious commitment among the general public. They did suggest, however, that among their active parishioners there was an increased desire to better understand their own church's theology, and a strengthening of family commitment to the church, particularly for the children.

The personal reaction to CUT (and similarly perceived relig-

ious groups) primarily is grounded in what persons understand to be its methods of proselytism and control of individual will. This reaction ranges over a wide continuum from minor annoyance with doorbell ringing missionaries to extreme hostility and fear regarding "mind control" by religious groups. This reaction is extremely emotional. It also tends to be protective; it is organized and justified around a felt need to protect innocent children from the malevolent influences of corrupt religious practice.

In Park County, there was a strong personal reaction to CUT relatively soon after it arrived. Community forums were organized in Livingston and Gardiner during November of 1982 at which time former CUT members spoke and cautioned the community to be wary of the Church....

There also have been accusations of harassment and intimidation leveled against CUT by its detractors. The Church emphatically denies such claims along with accusations about the "mind control" and "religious slavery" of its adherents. CUT has done relatively little proselytizing in Park County. In 1982, it opened a booth at the Park County Fair and attempted to distribute its material, but closed the operation at the request of the Fair Board. Residents of Park and neighboring Gallatin counties also have received unsolicited mailings of the Church's literature, primarily copies of Heart magazine, a quarterly publication. The Park County Sheriff investigated rumors that CUT members had been kidnapped (in other communities) and/or were being held against their will and he publically disclaimed the validity of both assertions. To date there has been no reported instance of a Park County resident joining CUT.

Antagonism toward CUT on personal grounds is not as vociferous as it was in the months following the Church's arrival. While there are still concerns about "mind control," "loss of children to Church membership" and related issues, the reaction to CUT based on personal criteria has muted and other, socio-political concerns have moved to the forefront.

The reaction to CUT based on sociopolitical criteria appears to consist of four elements. There is opposition to CUT's (1) corporate land use policy, (2) its general method of conducting business, (3) its alleged political motives, and (4) economic power. In each of these areas local concern and opposition extend beyond the Church's actions to an assessment of its motives and the apparent inconsistency of those motives with local values.

Gardiner area residents have a strong affinity for the land. It is the source of their livelihood through YNP, the tourist industry and subsistence activities, and the origin of much of their recreation. They also simply appreciate it for what it is; that it's there. Gardiner area residents are not strict preservationists; for the most part they want and expect to harvest the land's resources and market its appeal. They also do not want to

see the land base destroyed and they see precisely that in much of CUT's activities. After hearing that CUT had purchased the Forbes Ranch, one Gardiner area resident commented that the purchasers could have been "subdividers, clearcutters, overhunters, or ineffective ranchers." "I am very much relieved that they are not subdividers." (Livingston Enterprise, September 22, 1981). Subsequently, the Church subdivided a sizeable portion of its property and began a large scale capital improvement program aimed at improving agricultural production--primarily cereal grains, fruits, and vegetables. Local residents do not object to a landowner improving his property; to the contrary, they approve it. But, the massive scale of development on the former Forbes property, coupled with the subdivision filings, and the announcement of a planned community at Glastonbury, strikes many local residents as pure "profit maximization." Park County residents are not against making a profit but somehow the scale or intensity with which the Royal Teton Ranch pursues its goals strikes local residents as a disregard or lack of affinity for the land.

In a related sense there is adverse local reaction to what might be called CUT's "Doctrine of Exclusive Use." That is, CUT has established a no trespass policy regarding its lands. It also has denied the public access to some roads that cross its property. The road closure issue has lead the Church into conflict with both Park County government and the U.S. Forest Service, both of whom [sic] maintain that CUT's road closures have illegally denied public access to other private and public lands in the area. CUT disputes the latter charge and the matter probably will not be settled short of adjudication in a court-of-law. CUT also maintains that its "no trespass" policy is both legal and appropriate. Local people do not contest the Church's legal right to close their land but, nevertheless, it is viewed as unneighborly. Rightly or wrongly, the people of southern Park County assume a type of ownership over the land regardless of who formally holds title. They feel protective about "their (our) land" and also assume the right to use it, at least, in a limited sense for hunting, fishing, hiking, and so forth. CUT's attitude about no trespassing may be legally sound but socially unacceptable to Gardiner area residents.

CUT's style of doing business is described by local people as formal and legalistic. That approach is at variance with what Park County residents see as their relaxed, open, informal way of treating and doing business among neighbors. The contrast in style is frequently interpreted by Park County people as a reflection on CUT's lack of trust. In a related fashion, local people feel deceived by CUT's practice of doing business, particularly making large land acquisitions, through intermediaries. What is not clear is whether the objection is to secrecy in business affairs generally, or only those conducted by a religious body, or perhaps, just to CUT's practices. At the risk of oversimplification, Park County residents view CUT's business practices as cold, corporate maneuvering. And while they are willing to grant that such an approach may be both common and even necessary in a place

like California, it is viewed as inappropriate for Montana and, certainly, for Gardiner.

The adverse reaction to CUT on political grounds seems more a function of rumor and apprehension over its alleged growth plans than on concrete action taken by the Church. Park County residents commonly refer to the experience of Antelope, Oregon, where the Rajneesh International Foundation, an eastern mystical religious sect, bought a ranch, established a community, and eventually took over the political and governmental machinery of the town. At the time, Antelope, Oregon had less than 100 residents and its political takeover was affected through the registration of voters and subsequent balloting by the town's new residents who were members of Rajneesh. Members of CUT have registered to vote in Park County and likely will continue to do so in the future. Approximately 50 Church members were registered and voted in the 1982 election. The local community assumes they voted in a block for candidates perceived as more reasonably disposed to the Church Universal [and Triumphant]. But, there is no evidence to that fact. The Church has not publically engaged in any political activity on behalf of or in opposition to any candidate or ballot issue. CUT's corporate charter specifically prohibits such activity but, of course, its members are free to act on their own initiative in political matters if so moved.

CUT's political influence is more potential than real at this point. Currently, its membership is not sufficiently large to control the outcome of local elections even if it wanted to. It can, however, exert an influence in local politics simply by its presence or by contributing to local insecurity and divisiveness. The first approach acts as a persuasive force to help the Church gain a reasonable hearing from local officials. In other words, a wise politician does not ignore or antagonize a large block of voters. The second approach builds on local hostility toward the Church. It can divide the electorate by praising or condemning candidates, fielding a stable of "front men" to run for office and split the native's votes, and so forth. Local residents, particularly those in Gardiner where elections to special district governing boards involve relatively few voters, are aware of their political vulnerability.

Some residents of Park County concerned about CUT's potential political power, have formed a group called the Park County Freedom Foundation (PCFF) to monitor CUT's activities in the county and conduct voter registration and education drives to increase local participation in governmental affairs. The group proclaims it is not an "anti-CUT" group but its agenda and actions to date do not appear to support that position.

The final source of adverse reaction to the Church Universal [and Triumphant] is based on the institution's economic power. In the eyes of Park County residents, CUT has a seemingly limitless supply of funds drawn from member contributions, the sale of other Church properties, and the operation of other business ventures.

Clearly, CUT's local survival is not based upon its success in the region's local economy. CUT is virtually divorced from the local economy, a condition that not even YNP or the U.S. Forest Service can claim. CUT also is assumed to have access to a workforce that works for little or no wages. As such, the Church's business subsidiaries are viewed as potentially powerful rivals to local business when the business sells to a "disinterested" consumer. Government contracts where the bidding must be objective and in the tourist industry where the consumer has no vested interest in community life are two areas where CUT can successfully operate. Unlike Gardiner's business establishments, it does not need the Livingston/Gardiner clientele to survive. A similar situation prevails with land. CUT gives the impression that it has the resources to buy what it wants. Local interests fear that they will not be able to compete with CUT for the purchase or lease of ground for their agricultural operations.

Rumors continually circulate in Gardiner and Livingston regarding the jobs CUT members are applying for and what businesses they own or plan to acquire. Competition for work is another sore issue between Park County residents and CUT. Again, this issue seems to be more of a potential concern rather than a current happening. In Gardiner, a large part of the work force is only seasonally employed. In Livingston, layoffs on the railroad have substantially raised the local unemployment rate. Competition for jobs is strong throughout the county. CUT's membership is perceived as being made up of young, hard working, and, in many cases, highly skilled or educated persons who can successfully compete for jobs in the local market. Also, the objective qualifications of CUT membership is bolstered by corporate policies and state and federal statutes establishing non-discriminatory hiring practices. Thus, the desirable, high paying jobs offered by YNP and other federal agencies are fair game for CUT members. Even though CUT members appear to be almost fully employed within its own operations, the Church neither disavows or affirms concerns that its members will seek and, ultimately, achieve a place in the region's work force. When the prospect of job and business competitiveness is coupled with CUT's subdivision activity and projections of how big the Church contingent will be, the threat of being forced economically from the land seems very real to many Park County residents.

The Church's response to selected items included:

Third Party Purchases - The Jardine EIS Report states that "In total, CUT controls over 30,000 acres in southern and central Park County. In each case, CUT purchased the property through a third party, acting as an intermediary." This is not correct. Most of our property was purchased directly by the Church or its subsidiary Royal Teton, Ltd. In the several cases where an intermediary was involved, it was because an obvious effort to discriminate against us was taking place. In the first case (North Ranch - 13,333 acres), we were contacted by the realtor who had the listing and were urged to purchase the property at a

stated price. After negotiations were conducted in good faith for several months and all terms virtually agreed upon, pressure was brought to bear against the realtor to not allow the property to be sold to the Church. He stated he was afraid for his reputation. He then convinced the absentee owner, a New York stock broker, to sell the ranch to him and informed us that it was no longer on the market. However, when contacted by an intermediary (who had offered to purchase the ranch and then sell it to us for a profit), the realtor was more than eager to sell to him on similar terms as before.

In the second case (Burlington Northern Railroad Property - 5 acres and 2 buildings), we contacted, negotiated with and were assured by railroad officials that the property was for sale and available to us. But, they said, it must first be checked out with unnamed Livingston "city fathers" with whom they had an agreement to consult before completing any sales. Within a few days the railroad then informed us that the buildings were no longer for sale, for reasons unrelated to the Livingston "city fathers" consultation. But when contacted later that week by our intermediary, suddenly the buildings were for sale once again--at a similar price and terms as before.

In each of these cases we assessed our options as being: (1) take "no" for an answer and forget about it, even though we needed the facilities, (2) sue for discrimination and try to get a court to mandate more fair dealings, or (3) work through an intermediary to purchase the needed property at a fair price to the seller. The first two alternatives were determined to be unacceptable. The use of the third alternative, though regrettable, got the job done without creating legal or practical problems for anyone. The fact that both sellers were disinterested, absentee, corporate owners made this a more justifiable course of action.

As to the question of whether we are guilty of having "deceived" someone or having acted secretly, it should be clear that we have turned to the assistance of a third party only in cases where we were unfairly dealt with or lied to in the first place. We felt we responded in the most reasonable and practical manner possible short of litigation, while still maintaining our own honor in these situations.

Property Development - The report draws the conclusion that "The scale of CUT's land purchases has been exceeded only by its energy in developing the property. It has filed aliquot subdivisions for much of its land." What is referred to here is an aliquot division (legal description of parcels according to aliquot parts of the public land survey) that was filed on the South Ranch (former Forbes Ranch - 12,000 acres) in 1982. However, this was done in response to a proposed emergency interim zoning ordinance proposed at that time by the County Planning Board, which we felt was specifically directed against our presence in the county. At the time we explained that our action was to protect our property rights and that we had no intention of ever selling these lots. We have not to this date ever sold a single lot and none of the Church's other ranch property has been so subdivided.

And it is not our intention to do so in the future. Interestingly enough, after the aliquot division occurred the zoning proposal was then dropped. It should be clear, therefore, that the nature and intent of this action was not "developing the property" as asserted in the report, but protecting our property rights.

Later in the report a local resident is quoted from a newspaper article about the Church as saying that "'I am very much relieved that they are not subdividers' (Livingston Enterprise, September 22, 1981)," but that "subsequently, the Church subdivided a sizeable portion of its property..." There is a large difference between an aliquot division to protect property rights with no subsequent sales, which did occur, and the development and sale of lots to customers, which has still not occurred even four years after the writing of the Jardine EIS Report.

New Residents - The report states that "Local concern over the Glastonbury plan has spawned rumors that CUT plans to move from 1,000 to 5,000 of its members to Park County. The Church neither confirms nor denies the rumors." The EIS process now being pursued on the Church's development has specifically focused on the number of staff we expect to have in Park County (500-600) and students attending quarters at Summit University (160 max.). We have no control over members not employed by the Church. Nor do we have the power to decide to move these members to Park County--this is an individual decision. And the Church does not offer to support any of these people. Most of those who have come are either retired with independent incomes or have brought their own businesses with them--both an improvement to the local economy. Very few have competed in the local job market. In any event, the 1,000 to 5,000 Church members rumored to be coming to Park County in the report is astronomically overestimated.

Relationships - Although the Jardine EIS Report finds that "...both CUT and the local residents feel wronged and threatened by the other," we do not feel this way and we doubt that most of the local residents and our neighbors feel this way. In general, we feel we have gotten along well with Park County and are satisfied with our relationships with most people. We believe that the report's writer has concentrated too much on the feelings of a vocal few who have opposed the Church from the beginning in the county and who have attempted to engender the "we" and "they" attitudes assumed to exist across the board by the report.

Community Forums - The report recalls that "Community forums were organized in Livingston and Gardiner during November of 1982 at which time former CUT members spoke and cautioned the community to be wary of the Church." However, to be more accurate it should be pointed out that those meetings only featured one ex-Church member (Gregory Mull), and his daughter, and they were held not in 1982 but in the fall of 1981 shortly after our arrival here. The Church was engaged in a lawsuit with Mull, the latter claiming he had been "brainwashed" and controlled by the Church and demanding the sum of \$253 million compensation in his suit. Suffice it to

say that Mr. Mull had a very large axe to grind.

While the case was decided last year at least partially in Mull's favor in a Los Angeles trial court, it is on appeal for numerous irregularities and to determine if the Church's religion, in effect, was unconstitutionally put on trial. We believe it was and the jury was thereby prejudiced. Mr. Mull died in a hospital in July of 1986 from complications connected with multiple sclerosis from which he suffered.

It should be pointed out at this time, however, that few if any of his predictions have come true--including charges that the Church would try to take over the Park County government and influence voting, that local residents would be heavily proselytized, that Gardiner would be bought up and controlled by the Church, and that residents would be harassed and intimidated with threats of violence. In our view, Mull was trying to incite such acts in an effort to prove his case. We have said, and we believe we have proven, that we will not react or respond to such disinformation campaigns. We prefer to prove our case over the long run with our actions.

Doctrine of Use - The report inaccurately criticizes the Church by concluding that "In a related sense there is adverse local reaction to what might be called CUT's 'Doctrine of Exclusive Use.' That is, CUT has established a no trespass policy regarding its lands." In the first place, we do not have a rigid "no trespass policy," although we do expect people to ask for permission. However, even worse than the inaccuracy regarding our policy, what this amounts to is the creation of a higher and more rigid standard for the Church than for other local landowners and residents. It is true that the Forbes Ranch was more open in the past--not because of a more liberal Forbes' policy but because he had almost nobody here to watch the place. The result was a high incidence of trespassing, poaching, horn hunting and theft. In effect, some people were exploiting the place--killing game out of season, conducting unauthorized outfitting, cutting trees, carrying off historical artifacts and damaging the land--because Forbes was a disinterested absentee owner who saw no reason to have more than a single person take care of the whole ranch.

This contrasts sharply with most local ranchers who watch their land closely and decide whether or not they want to have people out there or not, and when. Many of them outfit their own property or lease to an outfitter. Almost nobody consents to the public use of their land without permission. It is almost ludicrous for the Jardine EIS Report to fault the Church for a method of managing its property that is essentially the same as other landowners.

We do restrict trophy elk and deer hunting during the regular hunting season because that's an important economic resource for which we've paid with our purchase of the land and through the annual use of range forage by wild game. And it's a natural

resource that was rapidly being depleted by past practices. We do, however, allow plenty of free public hunting on the ranch--including several hundred "B" Tags, the late elk hunt on Cinnabar Mountain and dozens of antelope permits each year. And we give permission to many hikers to cross the ranch to climb Electric Peak or walk to Sportsman Lake, or to visit the Aldridge Ghost Town and several old cemeteries on the ranch. We have a much more liberal policy, in fact, than many other private landowners in the area.

What more likely irks some people is the fact that in the past the Forbes Ranch was being treated more like National Forest land--unlike other private land in the area. In fact, the U.S. Forest Service had an option to purchase the ranch for over a year in 1980-81--and passed on the opportunity. At the time this may have created an unrealistic expectation in the minds of residents and government officials that the land was almost already public--hence the complaining for several years after our purchase over our more restrictive policy for the use of roads and other private areas of the ranch.

That's unfortunate. But private land is private and it's the owner's prerogative to determine what wise and fair use is, and what kind of use is too much. The public agency in charge had a shot to purchase it and gave up. We should now be looked at the same as any other private landowner.

Business Demeanor - The report also criticizes the Church's business demeanor with the following statements:

"CUT's style of doing business is described by local people as formal and legalistic. That approach is at variance with what Park County residents see as their relaxed, open, informal way of treating and doing business among neighbors. The contrast in style is frequently interpreted by Park County people as a reflection on CUT's lack of trust. In a related fashion, local people feel deceived by CUT's practice of doing business, particularly making large land acquisitions, through intermediaries... At the risk of oversimplification, Park County residents view CUT's business practices as cold, corporate maneuvering. And while they are willing to grant that such an approach may be both common and even necessary in a place like California, it is viewed as inappropriate for Montana and, certainly, for Gardiner."

The report, however, cites no examples of this "style of doing business" other than the land purchases--which has been previously explained. We think it is another example of the report assigning a higher standard to the Church than most residents hold for themselves. Maybe it's true in the case of sizeable organizations that a higher standard is expected by the public--and if so, then a slightly more formal method of conducting business is probably called for.

While we have carried out hundreds of agreements on a hand-

shake, this can be dangerous in some cases. The lack of a written agreement was the origin of the previously referenced lawsuit with Gregory Mull--he later said we agreed to something that was never discussed. Both of the land purchases that went sour and had to be concluded with intermediaries were initially conducted informally and with trust by us--with the result being "you don't have a written contract; sorry, we don't have to sell to you." And we all know that larger organizations such as railroads, mines, corporations, and today, churches, are viewed as potential target defendants.

It's unfortunate in this day and age that business is best conducted with a little more formality and with written agreements. But it usually protects both parties and keeps people out of court and from having hard feelings toward one another. We especially do not want to get involved in disputes and misunderstandings with neighbors and local residents--hence a slightly more formalistic style is appropriate and protects everyone. We try to keep it as informal as we can.

The Jardine EIS report seems to take a "damned if you do, and damned if you don't" type attitude on this subject. The Church is not trusted to act on a handshake, but faulted for acting too "formal and legalistic." Nevertheless, in the four years since the report was written, we believe a more relaxed approach has been attained by us in many ways--particularly as we have gotten to know more people we feel we can trust on a personal basis.

Political Intentions - The report's theorizing on Church political intentions and potential influence...is pure conjecture. There is no evidence cited, and none which has appeared now four years later, to suggest that the Church might use any of the tactics warned about. While it is an EIS writer's duty to reasonably foresee future trends and events, we question the propriety of dreaming up remote scenarios of possible future political conflicts. On the negative side, it can have the effect of giving people ideas they may not have otherwise had.

Indeed, while the Church has not engaged in any of the rumored political influencing, the Church's organized opposition in Park County has done so extensively. Both of the so-called anti-cult watchdog organizations in the County, Citizens Freedom Foundation (CFF) and Cult Awareness Research and Voter Education (CARVE), have run candidates for public offices--including the Livingston and Park County Government Study Commissions and the State Legislature--and have endorsed and opposed candidates for other offices.

Economic Power - The report's analysis of the Church's economic power is similarly filled with unresearched conjecture. The Church's treasury is by no means "unlimited" as suggested. It is large by comparison to an individual resident, but we support a total community staff of almost 500. On a per capita basis, our finances are probably more on a par with local residents' means.

We don't drive fancy cars, don't buy new equipment and don't live in luxury houses. We do pay salaries and other compensation to employees. No government contracts or outside jobs have ever been bid on by us. The only real competition with the local economy is The Ranch Kitchen restaurant--and that's not based on cheap prices but on quality of food and service.

If the Church ever was "divorced from the local economy," it certainly is not now. All of our headquarters and property are located here. The Church's policy on purchasing land and conducting business in the local area has been made clear in recent appearances by Church officials before the Livingston Kiwanis/Rotary Clubs, Gardiner Chamber of Commerce and other groups--the bulk of the land purchases are over and we do make a substantial contribution to the local economy.

Time is an important element when considering how successfully the Church will meld into life in Park County. The Church has been a presence for about six years, and its relationships with local residents are different now than they were when members began arriving in 1981. Dr. Smith mentions this gradual incorporation into local life in his conclusion by saying:

...the Church Universal and Triumphant is a new religious group who [*sic*] has been in existence for close to thirty years. As with any new religion, the group has persevered through turbulent times and has continued to grow and expand its operations. Conflict is endemic whenever human beings propose and act on specific plans or strategies that help them to deal with and constructively answer the myriad of questions which surround our daily struggle to find meaning in life.

The Church Universal and Triumphant's further "settling in" on the Royal Teton Ranch will depend, in a large part, on the final outcome of the hearings concerning the environmental impact study. The Church's ranching and farming operations are very successful and productive. They are truly on their way to becoming a self-sufficient spiritual community. The group appears to have the know-how, determination, and savvy to weather the present conflicts....

EMPLOYMENT AND PERSONAL INCOME

The Church points out it has already spent a substantial amount of money locally for goods and services and will continue to do so in the future. It adds that the people it employs, in turn, also spend an appreciable amount of money locally on goods and services. Accordingly, the Church contends this equates to the ultimate creation of more jobs:

On the average, the spending of four new full-time industrial or agricultural workers fosters one new full-time service sector job [Source: Mountain International, Inc. - Jardine Impact Plan, 1984]. While the Church's 200-250 new employees (160 in the Corwin Springs area) will receive a more modest income than

average workers in the private sector, their personal spending will undoubtedly generate new full-time jobs in Park County.

These new Church employees will not be taking or causing any redistribution of income away from current local residents because they will not be seeking jobs or competing in the local job market. To the contrary, there will be essentially a one-way flow of funds in that the Church employees will be spending some amount of their personal income into the local economy, without in any way displacing the current income of local residents.

TAXES

The Church is one of the major property tax taxpayers in Park County. Since exemptions for religious institutions apply only to the Church, parsonage and school facilities, much of the land, buildings, livestock and machinery will continue to be assessed for tax purposes. In 1986 the Church ranked fourth behind the Burlington Northern, Mountain Bell and the county's leading taxpayer, the Montana Power Company, according to the Park County Assessor's Office.

In discussing its contribution to the state and local tax base, the Church said:

The [proposed] projects will directly benefit the tax base in Park County in two...ways: (1) approximately 50 acres of land now classified as agricultural will likely be converted to a higher residential and institutional classification (with the exception of approximately 2 acres which might qualify for a church building exemption), and (2) the taxable value will increase commensurate with an increase in the market value of the real and personal property. Consequently, tax revenues for Park County and for both the elementary and high school districts in Gardiner should be... increased by the projects.

Because of railroad cutbacks, a depressed timber industry and poor agricultural markets, the real, inflation-adjusted taxable valuation of all property in the county has decreased by 40% over the last 12 years [Source: Montana Association of Counties-January, 1985]. On the other hand, and serving to mitigate this declining trend, Royal Teton, Ltd. in each of its five years in Park County has generated a sizeable increase in taxable property values....

Since the Church will (ultimately) have its own elementary and high school, the school-based portion of the local tax--which will be a very large portion of the tax revenue increase generated by Royal Teton, Ltd. property and operations--will be an ongoing windfall income for the local public school system....

The new employees and families of the Church will be less demanding on local tax revenue than other Park County residents. For example, the degree of usage of county roads by Church employees will likely be on the average very low because of emphasis on

carpooling and shuttle transportation. Also based upon five years of experience, other county services such as law enforcement will in all likelihood be very infrequently called upon. Our religious community does not permit the use of alcohol or illegal drugs; the incidence of criminal behavior of any kind whatsoever has been, and is reasonably predicted to continue to be, extremely low. For these reasons, while the projects and new residents will generate a sizeable increase in tax revenue, their presence is very unlikely to result in a comparable increase in the need for local public services, resulting in a small boon for the county government budget.

Only 6 mills of local property taxes is used to fund state government. The money generated from that millage rate is allocated to the state's university system.

Tax income generated from state income taxes is apportioned accordingly, 58.2% goes to the state's general fund, 10% to state government's long-range building fund and 31.8% is returned to local schools.

The Church said 250 new residents will be on the Church's payroll and, in addition to paying property taxes, will also be paying state income taxes.

In conclusion, the Church said:

Virtually all of the adults coming to Park County as a result of the two projects will be employed full-time by the Church. The work ethic is a major element in our religious community. Accepting state welfare benefits in any form is strongly discouraged by the tenets of our faith. Consequently, tax revenues collected for the state "poor fund" will clearly serve to enhance its financial solvency.

DEMANDS ON GOVERNMENT SERVICES

The church believes the lifestyle of its organization is a significant factor in requiring less government services per capita than other local residents. Although this may be true to some degree, Church members living in Park County do use, and will continue to use, some government services.

SCHOOLS

The Church has a private day-care/preschool center and an elementary school (kindergarten through sixth grade - K-6) in Corwin Springs. It did teach seventh grade through high school (7-12), but discontinued those classes for the time being. Ultimately, the Church plans to offer all 3 levels of instruction.

Children of Church members attend elementary school in Gardiner, Livingston and 3 country schools, Richland, Pine Creek and Arrowhead. Secondary students are enrolled at high schools in Livingston and Gardiner.

The school superintendents for Livingston and Gardiner estimated

enrollment of Church children in their districts to be about 20 and 30 pupils, respectively. Both districts seemed to be able to accommodate the enrollment. With the prospect of a future parochial high school, and possibly expanded elementary classes, the enrollments in Livingston, Gardiner and the rural schools could decline.

The 3 country elementary schools are more sensitive to enrollment increases. Arrowhead and Richland recently experienced significant increases. At Richland, school officials budgeted for 2 children and a total of 12 enrolled, according to the County School Superintendent's Office. The Richland school is planning to submit an emergency budget request which is an acceptable procedure when projected enrollments increase by more than 5%. In urban schools the addition of 10 to 16 pupils is a manageable increase, however in schools with small enrollments, these increases are significant.

FIRE PROTECTION

The RTR-S has its own volunteer fire department, which includes a fire truck and fire fighting equipment. In addition, the following plans have been made or are in process for establishing fire protection at major locations:

1. Spring Creek Church Headquarters Site--The 200,000-gallon domestic water storage reservoir will provide a gravity flow to fire hydrants placed around the site. It is to be completed in Phase II of construction.

2. Ranch Office Area--A plan is being developed to use the existing irrigation pipeline buried 8 ft deep running from Reese Creek to store approximately 45,000 gallons of water during winter for an emergency gravity flow of 500 gpm to a system of fire hydrants to be placed around the site. It is scheduled to be completed within 1-3 years.

3. East Gate Area--A plan is currently being examined to utilize the former Corwin Springs Plunge as a water storage reservoir for approximately 100,000 gallons, in conjunction with an electric fire pump, to provide 500-1,000 gpm to hydrants for emergency fire flow. Completion should occur within 1-3 years, if feasible.

4. Ranch Headquarters--A plan has been developed to utilize an existing 38,000-gallon buried storage tank and electric fire pump to provide 1,000 gpm to a system of 4 outdoor hydrants and one interior sprinkler system for emergency fire flow. Installation is now in process.

LAW ENFORCEMENT

Again, the Church purports its style of life plays an important role in discouraging violence and criminal activity, thus reducing law enforcement needs.

The Park County Sheriff's Office did verify there have been few violent or criminal incidents associated with the Church; however, traffic and "non-

criminal" activities have placed additional demands on the department.

During the annual conferences the sheriff's office needs to assign extra help to control traffic in the Corwin Springs area. Another traffic-related problem has been checking to see if new residents have purchased Montana licenses and plates.

In the area of noncriminal activities, the sheriff's office said it has received requests to attempt to locate persons presumed to be living in the Church community and to check out reports of suspicious activities, such as "paramilitary activities" and "stock piles of automatic weapons." Although all the reports of unusual activities have been investigated, none of these incidents have been "validated," according to the office.

The Park County Sheriff's Office had 11 personnel in 1979-80; however, due to budget restraints, the number has been reduced to 7 persons. The Gardiner area--including Corwin Springs--has 2 deputies. Due to the increased demands created collectively by the Church, the development of the Jardine mining project and the seasonal influx of people to YNP, law enforcement--particularly patrolling and traffic control--in the area is being severely stressed.

PLANNING AND PROJECT REVIEWS

Both the city-county planner and the county sanitarian estimate they spend about a quarter of their time working with the Church or on Church-related activities.

TRANSPORTATION

Transportation plays an important role in the day-to-day operation of the RTR-S. In addition to automobile, light truck and shuttle bus traffic, there is also traffic from heavy trucks and occasional air transportation.

TRAFFIC SURVEY REPORT

In an effort to establish current traffic volumes by Church members in the Corwin Springs area and predict what future volumes might be, the Church prepared a traffic survey report last spring. The following is a synopsis of that report:

If the developments were part of a typical suburban residential community composed of conventional single-family or multi-family dwellings, the trip generation figures from the Institute of Transportation Engineers (ITE) manual could be used to predict future traffic. However, because of the unique characteristics and self-contained nature of this community, the normal ITE method for estimating traffic generation would likely produce inaccurate volumes, and therefore we have chosen not to use it. A comparison is made to the ITE figures later in the report.

The county roads on the west side of the Yellowstone River at the Royal Teton Ranch provide the transportation link for three existing activity sites maintained by the Church--the Ranch Office

(RO), the East Gate/Camp Mustang/Corwin Springs Area (EG) and the Ranch Headquarters (RHQ)--as well as for the proposed Spring Creek Church Headquarters Site (SC). While Church-associated vehicles do travel on the county roads to get out to Highway 89 for travel north or south, it appears that most of them are traveling between RHQ, EG and RO only.

The method chosen to predict future traffic generation for the completed developments was to analyze Church staff travel patterns by individuals and departments and compare them to existing road usage ascertained by visual observations, and then to modify them based upon a model of future estimated staff and student populations, the planned arrangement of Church departments and the resulting travel needs.

First, the actual one-way vehicle trips being made on the county roads at the present time were physically counted. Second, a written survey of the adult members of the community was conducted to determine where they travel now, for what purposes, how often and by what modes of transportation. Third, this information was tabulated and analyzed by computer to show traffic patterns predicted by the survey as compared to the actual physical count, and the percentage difference or correction factor was noted. Fourth, these known patterns were then applied to the planned populations and sites in a detailed manner to give future projected vehicle trips per day. Fifth, the correction factor representing the difference between actual existing (from the survey) was applied to the projected figures to arrive at a final estimated number of vehicle trips to be generated each day after completion of the proposed developments.

The end result of this process is that an estimated 581 one-way vehicle trips per day should be generated by the Church on the county roads west of the Yellowstone River after construction of all proposed projects has been completed. This figure can be broken down into an estimated 437 one-way trips on the county road north of the Corwin Springs bridge and an estimated 554 one-way trips south of it. Since some cars travel on both segments of the road in a single trip, the sum of the two legs is more than the total.

By comparison, the existing travel is generating a total of 526 one-way trips per day, including an average of 409 one-way vehicle trips per day north of the bridge and 203 trips south of it. Thus, it is estimated that the Church's proposed developments will generate an increase of approximately 55 one-way vehicle trips per day overall, or a projected total increase of about 10.5% over present usage.

... while there will be a modest increase of vehicles on the road in the future, there will be fewer than expected based on current populations and traffic patterns. The main reasons for this are (1) the consolidation of most Church departments and activities at Spring Creek, (2) the fact that most staff and

students will live and work or attend classes at the same locations in the future (3) the providing of key services and facilities such as post office, laundry, dining hall, chapel, child care, etc. at each major activity site, and (4) because almost all of the 56 students living at East Gate will be bused from school to their housing each day.

The above conclusions do not take into account ongoing efforts by the Church to make travel more efficient and reduce vehicular use by creating a more dependable system of bus and shuttle van transportation for community members. These efforts could result in future decreases from even present traffic volumes on the county roads.

If this were a typical residential community for a rural area, much more traffic could be expected on the roads than the 581 vehicle trips per day that is projected. As a means of comparison we could use the lowest ITE trip generated figure for single-family homes of 4.3 trips per household per day. By adding .1 to it, we would adjust for the commercial traffic coming to this ranch that would not exist for single-family homes. This would give us a factor of 4.4 vehicle trips per day per household. A population of 533 adults would equal 267 households, assuming 2 adults per household. The 267 households would generate as much as 1175 vehicle trips per day. This is almost twice as many trips per day as the future model projects for traffic to be generated by this community as a result of the proposed developments.

There are many reasons to explain why this community will generate less traffic than would be expected for a typical residential community of similar size. Residents live a religious, monastic type of lifestyle where their work is more integral to the daily routine than is the case for the public at large. Living, working, dining and praying together in a close-knit community is the essence of the lifestyle, and the developments are oriented around producing that result. Consequently, most staff will not be commuting to work or travelling to eat or attend religious or social functions. There is very little travel off the ranch because most personal services are provided here. Many people do not own cars or have vehicles for their own use, and a high percentage of people prefer to use the shuttle services, bicycles or their legs to travel between facilities.

It is therefore believed that the overall impacts on the county roads, wildlife and public safety as a result of the proposed developments will be minimal. In addition, the Church's efforts to enhance group transportation on the ranch and to work with Park County on a cooperative basis to improve and upgrade county road surfaces should help to mitigate the impacts that are expected.

WORK WITH PARK COUNTY

Last spring the Church sent a letter to the Park County Commission

outlining a plan for upgrading a number of county roads on RTR-S property. In general, the Church proposed to pay for the materials to improve selected roads--such as soil-clay binder for resurfacing and magnesium chloride for dust suppression--in return it asked the county to provide much of the equipment work. Since then, the county and Church have done some road improvement and dust suppression.

CORWIN SPRINGS BRIDGE

When the 225-foot steel truss, single-lane bridge was built in 1908, it provided a dependable means of access from the road and railroad on the west side of the river to the plunge and hotel on the east bank. Ultimately the highway servicing Corwin Springs was built east of the river, changing the predominant flow of traffic for those using the bridge. This use increased appreciably when the Church purchased the ranch and began developing areas west of the Yellowstone. Although still a vital link in joining the two sides of the river, its single lane and load limit of 11 tons have created problems for the Church.

Trucks weighing more than 11 tons now must travel a little over 7 miles (or more than 14 miles round trip) along a gravel county road between Gardiner and Corwin Springs to service RTR-S needs on the west side of the river. About 4 miles of the road goes through YNP land. The Park Service is concerned with the increase in traffic and expressed this concern in a letter to the DHES (dated February 12, 1987):

Apparently due to restrictions on the Corwin Springs Bridge, the county road which traverses Yellowstone Park lowlands in the Stephens/Reese Creek vicinity has seen a tremendous increase in use, especially by heavy equipment and tractor-trailer rigs. This road, which bisects vital core winter wildlife range, has historically sustained low vehicle use and has therefore afforded the wintering wildlife minimal disturbance. We are concerned that the increased traffic will have deleterious effects on area wildlife population by causing more deaths due to collision and by increasing displacement from important ranges. Recent indications suggest that dust is a growing problem as well. We believe these impacts should be addressed by the Royal Teton Ranch.

The road is also used by nonChurch persons, not only by local residents, but also by tourists who choose to take an alternate route to enter the park.

The Church has contacted the county about retrofitting the bridge to increase the minimum tonnage. One successful rehabilitation was done to a similar bridge in northern Idaho. The cost for upgrading the Idaho bridge was \$280,000.

There is a federal/state highway program to replace "off-system" bridges. The federal government pays 80% of the costs and the state 20%. To become eligible for the funding, counties must periodically respond to requests from the State Department of Highways (DOH) to assess the bridges in their counties that are eligible for the replacement program and nominate appropriate structures. The nominations from all the counties are then

ranked according to structural need on a statewide basis for future construction by the DOH.

A year or so ago the counties were asked to submit eligible bridges to the state. Park County included the Corwin Springs bridge in its list, but it did not receive a priority ranking for construction in the near future. However, as bridges are reconstructed and replaced, the Corwin Springs structure will move up in the rankings.

Unless the need to replace the bridge increases appreciably in the next few years or the Church is able to financially underwrite all or much of the cost to rehabilitate it, it appears that vehicles which are too heavy to cross at Corwin Springs will continue to use the gravel road.

As part of the Church's proposed plan to improve the county roads on its own property, the stretch of road from the Ranch Office to the bridge has been targeted for improvement and dust control. There is about a three-quarter-mile stretch south between the office and the start of the park's boundary, which runs through RTR-S and private property. Since the road from the bridge to Gardiner is a county road, future plans for dust abatement and improvements will be under the jurisdiction of Park County. Currently, there are no major plans for road improvement.

RTR-S AIRSTRIP

The Church built a 2,600-foot airstrip just north of the former Trestle Ranch headquarters, on the west side of the river. In addition to a hanger for a single aircraft, it has tiedown space for 6 to 8 single-engine or light twin-engine aircraft. However, to date, only 1 tie down has been installed in addition to the hanger.

The strip is not open to the public, but permission is given to those visiting the ranch and for emergency use.

According to the Church, use in the last few years has averaged several departures and arrivals per week, but there have been times when use increased to several flights a day. The airfield was used as the base of operations when aerial applications of a biological insecticide were used to treat an infestation of spruce budworm in the Mol Heron drainage in 1986. While use of the airstrip for such purposes creates a potential for herbicide contamination due to its proximity to the Yellowstone River, the likelihood of environmental impact is slight.

The airstrip is only designed for light aircraft and use during daylight.

LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS

Since land-use planning is an important local responsibility, the Park County Planning Board and city-county planner were asked to outline planning activities in the county, specifically emphasizing how those activities have related to the church. The board and Planning Director Ben Berto said:

Planning started in Park County following the passage of the

1973 Montana Subdivision and Platting Act. The first meeting of the Park County Planning Board was held in September of 1973. A topic of discussion at the first meeting was the need for a comprehensive plan. It was suggested to "study the county portion by portion" in order to create a "multiple land-use plan."

...The first planner...was hired in 1975 on a part-time basis....a second city-county planner [was hired] in 1980.

The Livingston Enterprise reported in February 1980 that 2,400 acres had been split-up as reviewed subdivisions, and 14,000 acres had been split-up as unreviewed subdivisions. In response to the unregulated development, the first interim zoning regulation proposal was brought before the county commissioners in March 1980 (under the authority stated in 76-2-206 MCA, which permits adoption of interim zoning regulations if the county is doing or preparing to do a comprehensive plan).

By 1981, work was started on a comprehensive plan. In September, CUT purchased the 12,000 acre Forbes Ranch, renaming it the Royal Teton Ranch. In October 1981, a group of Gardiner businessmen presented a petition to the county commissioners seeking a development moratorium. Plans proceeded forward on an interim zoning plan. An additional part-time planner was hired to help with the work.

In March 1982,...[a]...third county planner [was hired].

In May, CUT responded to a countywide interim zoning proposal, which would have placed agricultural zoning on its property, by dividing its property into hundreds of 20-acre parcels. The county commissioners never voted on a zoning resolution, stating instead that such a proposal should be put to a vote of the people. An unofficial poll was taken soon after the commission decision, and the majority of those responding were against the zoning proposed. Based on the response, attempts to present the issue for an official public vote were dropped.

In August 1982, a land-use survey was sent out to approximately 2,300 Park County residents, every landowner outside Livingston's 4.5 mile jurisdictional zoning area, and Clyde Park. The survey had a 24% response rate, well over the minimum necessary for a statistically valid survey. The results of that survey, reported in September, were that 77% of the residents supported some form of land-use controls. Specifically, "zoning districts" received a 66% favorable rating, while "land-use density" controls received a 67% favorable rating. Agricultural land-use was to be the most encouraged, with an 83% approval rating. Subdivisions were rated last.

[Also] in August..., CUT purchased land near Emigrant. This property, called Glastonbury...was divided into 20-acre tracts to convey to CUT members.

Work proceeded on a comprehensive plan. An additional part-time planner was hired to help out with this effort.

By 1983, the head of CUT indicated that its headquarters would be moved from California in 3 to 5 years. Elizabeth Clare Prophet...in a 1983 interview said that 1,000 people was "an ideal number" of members...[to settle in Park County].

By 1984, CUT was beginning to bring in proposals for subdivision splits off its 20-acre tracts at Glastonbury. Due in part to questions about access, water supply, whether there was a public need for the subdivisions, as well as public sentiment against these proposals, the planning board recommended denial on all these. The county commissioners modified this by conditionally approving two proposals. The first of these, a residential minor subdivision, never was filed because CUT would not agree to create [a] public park area. The second project, a mobile home park, was conditionally approved by the commissioners and the terms of the approval were met. This involved Golden Age Village, a 49-unit park. CUT agreed to build a second access to the park.

...[A] new county planner [was hired] in April 1984.

In 1985, a CUT member came in with a minor subdivision proposal at Glastonbury. This was turned down by both the planning board and county commissioners. They cited problems with having no knowledge of any overall development plan for Glastonbury, and what the cumulative impacts of development might be with respect to water tables, emergency services, transportation, etc. Due to inadvertently going over the 35-day period for review, the commissioners were forced to approve this minor subdivision.

...CUT announced in July 1986 that it had sold its former headquarters in California and was transferring [all operations] to Park County....

...In August 1986,...the county planner decided that...[development in the Corwin Springs area]...was reviewable as a subdivision. It contained multiple spaces for mobile homes, which is defined as a subdivision under the Montana statutes. The...CUT...moved all mobile units off the area, substituting instead modular housing and called the development a "work camp." Ed Francis, vice president of CUT, stated in October 1986 that CUT hoped to have 400-500 members on the Ranch by December.

In late October 1986, the...DHES began scoping sessions in order to decide whether an EIS was warranted for CUT-owned property in the Forbes Ranch, Spring Gulch, Corwin Springs, Ranch Headquarters, Trestle, and Big Spur areas. The National Park Service, the Gallatin National Forest, the Northern Yellowstone Tim Alliance, the Bear Creek Council, Trout Unlimited, the Fishing and Floating Outfitters Association of Montana, and the Greater Yellowstone Coalition all expressed concern about the developments and the need for review.

In late November, the...(DHES) decided to go ahead with an EIS on CUT developments.

...[The present]...city-county planner [was hired] in April 1987....

The big Spur mobile home park/campground operated by CUT became the object of controversy in May 1987 when it was discovered CUT...was operating a central kitchen facility without... approval from any local or state authorities. Whether...the kitchen would be allowed to remain became an issue in the approval of the plat for Big Spur. The planning board recommended, and the county commissioners ordered, that the kitchen be removed by a set date as a condition of final preliminary approval. As CUT has been unable to operate the facility elsewhere (due to its projects being frozen pending EIS review and approval), the commissioners have twice extended the deadline for removal of the central kitchen.

DISTRIBUTION AND DENSITY OF POPULATION AND HOUSING

The Church contends its type of land use is "considerably less dense than the established norm" in the Corwin Springs area. To illustrate this it prepared a report of "...land use, housing and population capacities in the area between Gardiner and Yankee Jim Canyon along the Yellowstone River." In summary, it said:

The first study quantifies the existing development, planned additions and cumulative totals on the Royal Teton Ranch [RTR-S] [including the planned Church projects]. The second study analyzes all other private development in the same area and compares it to the Royal Teton Ranch. The relevant results of the study are as follows:

1. Most of the private ownerships in the area other than the Royal Teton Ranch are on the east side of the Yellowstone River, while most of the Church's property in single ownership is on the west side.
2. In the study area there are approximately 76 different private ownerships other than RTR on a total of 1,618 acres, with an average ownership size of 21.3 acres. The Royal Teton Ranch is in one ownership of approximately 3,250 acres along the same section of the river.
3. There are a total of approximately 119 houses, cottages, and mobile and modular homes on non-RTR-S land, and with an assumed occupancy of 3.1 persons per dwelling (Montana average), a total population capacity of 369 persons. On the Royal Teton Ranch there are a total of 48 houses, cottages and mobile and modular dwellings with an actual occupancy of 214 persons. Our proposed developments will bring that total up to 596 persons and 111 dwellings.

4. The established housing density on non-RTR-S land is 13.6 acres per dwelling and on Royal Teton Ranch land is 65.0 acres per dwelling. With the addition of the planned developments, the housing density will be 29.3 acres per dwelling on the Royal Teton Ranch--less than one-half the density of other private land in the area (mostly on the east side of the river).

5. The established population density on non-RTR-S land is 4.4 acres per person and on Royal Teton Ranch land is 12.7 acres per person. With the addition of the planned developments, the population density will be 5.5 acres per person on the Royal Teton Ranch--still about 25% less than the density of other private land in the area (again, mostly on the east side of the river).

6. By contrast, the remainder of the RTR-S land not adjacent to the Yellowstone River (about 12,000 acres) will have very few occupants, with a housing density of less than one house per 1,000 acres and a population density of less than one person per 1,000 acres.

HUMAN HEALTH

Philosophically, the Church's followers practice a "holistic" approach to human health, which includes proper diet, exercise, avoiding harmful substances, fasting and natural healing methods. This is supplemented with the use of various medical professions.

Within its organization, it has staff nurses and has periodic access to visiting chiropractors and physicians. Additionally, the Church is designing a comprehensive health, medical and dental insurance plan for employees and their families.

In instances of emergency medical service, the Church has trained emergency medical personnel and owns its own ambulance. Last summer it applied for and received a license from the DHES for its ambulance service.

Work camp licenses have been proposed for the East Gate and Spring Creek sites. The public water and sewer systems will be reviewed by the DHES WQB. The remainder of the provisions of the licenses will be reviewed by the DHES FCSB. These provisions include (1) food service, (2) on-site solid waste storage and handling, (3) shelter, (4) insect, rodent and weed control, (5) water distribution service laterals and risers, and (6) sewage collection service laterals and risers.

Plans for these facilities have been submitted and reviewed by the F&CSB, and found to be in compliance. Approval will be withheld until after the completion of the EIS process.

ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES

The Church does allow the public to take part in a variety of outdoor recreational activities, but requires that persons receive permission before

pursuing those activities. For more information on recreational use of Church property see Doctrine of Use in the Social and Cultural Uniqueness and Diversity section.

PRIMARY, SECONDARY AND CUMULATIVE IMPACTS

No matter where it occurs, the creation of a new community invites some degree of attention. The setting and the known aims and goals of the new group can affect assimilation. In a major metropolitan area, establishment of a group with common beliefs might not generate the curiosity and stir it would in a more rural setting.

Due to religious and practical considerations, the Church Universal and Triumphant chose to create a new community, specifically in the Corwin Springs area and generally in Park County. It found the land to be inspirational and productive enough to feed a good share of its followers. However, because of concern about the basic tenets of its beliefs and the fact it settled adjacent to one of the unique natural settings in the world--Yellowstone National Park--the Church discovered itself faced with uncertain neighbors, government officials and curious members of the public. Since its purchase of the Forbes Ranch in the early 1980s, the Church, its neighbors and people in Park County have gotten to know each other a little better. There have been problems. Some have been solved, some compromised and some remain unsolved. Economically, the Church has put money into the local economy and helped pay for government services. It has also relied on some of those services and, to a degree, economically benefited from the people in the area.

The primary impact has been the establishment of a new community in the Corwin Springs area. This was a development that had not been anticipated or ushered in with any local or county planning. Attempts had been made to establish some form of land-use planning but were rejected by local citizens.

It's impossible to build a new community without creating a number of secondary impacts. Sharing common boundaries with a famous trout fishery, the Yellowstone River, a renowned national park and a well-known national forest simply increases the number of problems and concerns.

Considerations related to secondary impacts include:

- In the course of planning developments, considering the maintenance of established migration routes and winter range for wildlife;
- Being cognizant and taking into consideration the importance of sustaining the trout fishery in the Yellowstone and its feeder streams;
- Maintaining the water quality in adjacent streams and lakes;
- Insuring that development proceeds in an orderly fashion and that efforts are made to reduce visual impacts;
- Through the proper disposal of waste products, reducing the possibility of attracting predators and game animals;

- Through the use of approved construction techniques, reducing the potential for erosion and increased sedimentation to local waterways;
- Considering the effects of the application of chemicals in agriculture and other maintenance programs before using them, and closely monitoring the results;
- Working with federal agencies to provide access to public land and insuring that natural resources are not damaged or destroyed;
- The assessing of historical and archaeological resources and proceeding with inventories before construction or development, and
- Working with local government officials to identify and solve common concerns, such as the condition of roads, law enforcement and future planning.

Many of the people in the Corwin Springs-Gardiner area share common bonds. They live there because it is beautiful. Many also value the idea of independence. These values are also espoused by the Church--even though some consider it a threat to both the landscape and their independence.

The area is in a state of change. The Church has established a presence, as has the Jardine mining venture. Both propose physical changes to the land. If up-to-date planning efforts are incorporated into the developments, the cumulative effect to the countryside can be reduced and the inspirational nature of the setting maintained.

Through a government review process, impacts of mining will proceed on a planned basis. The Church's plans for using a clustered development approach allows the majority of the land to be maintained in a natural state or used for agricultural cultivation. When considering the range of possibilities that can take place with any development, the plans of the Church and the gold mine are aimed at reducing or eliminating impacts to existing environmental resources.

Although not a popular idea in the past, one means for the people in the area to maintain some of their community values is through land use planning. They have the means to do so, even though it might be in conflict with their sense of individual independence.

The Church, like the mine, won't by itself change the nature of life in the area, but as an element of the whole, it will cumulatively contribute to that change.

POTENTIAL GROWTH-INDUCING OR GROWTH-INHIBITING IMPACTS

The creation of the Church's proposed facilities must be considered growth inducing. Although the number of permanent personnel may not increase significantly above the projections upon which this environmental review is being conducted, the new developments will enable the Church to facilitate more people for short periods of time, such as students or persons attending religious educational sessions.

While the number of permanent personnel can be accurately projected, the number of persons associated with the Church but not specifically employed by the Church cannot be estimated but can be expected to increase. They will reside in the area because of the Church's presence, will not be directly employed by the Church, and may therefore have a different impact on the area.

While there is room for expansion, given the Church's philosophy of consolidating buildings in established areas, much of the aesthetic integrity of the area should be maintained.

Future development plans which will affect growth will be closely reviewed by governmental agencies. The review that has been conducted in this process evaluates the impacts of the development as currently envisioned and proposed by the Church. Any further development which exceeds the current proposal and requires specific decision making by a state agency will be evaluated at that time under the Montana Environmental Policy Act.

While, as previously stated, the proposed project will generally be growth-inducing, there is a possibility that the mere presence of the Church will be growth-inhibiting in that people not associated with the Church will be reluctant to locate in the area.

Growth in the area may be limited or controlled in the future with implementation of community planning and/or zoning, if people in the area elect to do so. The history of local planning would indicate that the likelihood of areawide planning control is slight.

The fact that the Church chooses to be a somewhat closed society might be a factor in discouraging some people from living in the area. However, the location and scenery are probably two of the most important considerations for living there, so the presence of the Church might not pose as much a distraction as it might elsewhere in another setting.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF ENVIRONMENTAL RESOURCES

Approval and implementation of the Church's development plans will result in the irreversible commitment of some resources. Materials used in the construction of buildings and the land upon which the construction occurs will for all practical purposes be lost for other use. An additional 85 acres will be used for structures and landscaping under the Church's proposal, raising the total amount of acreage used for such purposes from the current 33 acres to a total of 118 acres. While this will be an irretrievable loss, it constitutes only a small percentage of the total RTR-S acres.

With respect to wildlife, some smaller mammals and reptiles will be displaced by construction activities. It is anticipated that these animals will merely re-locate to adjacent habitat. Larger wildlife should be able to adjust to the development without seriously threatening established migration habits, if the proposed mitigation plans proposed by the Church are implemented.

It is not anticipated that there will be any irreversible impacts on

aquatic resources.

The Church's plans provide for continued production of crops and timber resources. The harvest of such products represents an irretrievable commitment of resources but reflects a practice that has taken place on this property for a number of years, including that period of time prior to the property being purchased by the Church.

The planned development and use of a geothermal well across from La Duke Hot Springs could have an irreversible impact on geothermal resources in the area including Yellowstone National Park. However, until additional studies are conducted and the Church elects to actively pursue a change in point-of-use as required by the DNRC, the issue will remain dormant.

The development currently proposed does not require utilization of the geothermal well. Should that part of the Church's development plan be pursued and properly approved by DNRC, the extraction of heat from the water coming from the geothermal well would constitute an irretrievable and irreversible commitment of resources.

ECONOMIC AND ENVIRONMENTAL BENEFITS AND COSTS

Benefits

1. Local economies will continue to benefit from the purchase of goods and services;
2. Local governments will realize increased taxes from the land scheduled for development;
3. The Reese Creek fishery could improve with an agreement to maintain a minimum flow in the stream;
4. County roads on RTR-S property will improve based on continued cooperative efforts by the county and Church;
5. Much of the proposed development is occurring at established sites on land formerly used for industrial purposes;
6. Noxious plant and pest control programs will help reduce the spread of weeds;
7. Car pooling and shuttle busing will reduce impacts to roads, and
8. The proper disposal of human and agricultural wastes will reduce the possibility of environmental degradation and lessen the chance of confrontation with scavenging wildlife.

Costs:

1. Some government services will be affected more than others, such as law enforcement, planning and schools;
2. Some wildlife will be permanently displaced;

3. Problems might be created for wildlife due to increased cultivation and urbanization;
4. More people using the RTR-S land--even on a periodic basis--might be a factor in prompting some wildlife to leave previously used ranges;
5. The increased use of the county road between Gardiner and Corwin Springs (west of the river) by large vehicles may disrupt wildlife and require more road maintenance than anticipated;
6. A slight amount of nutrients may find their way to the Yellowstone, adding to the total amount of nutrients from upstream sources, and
7. There will be some permanent aesthetic changes, particularly in the Corwin Springs area.

SHORT-TERM USES OF MAN'S ENVIRONMENT VS. LONG-TERM PRODUCTIVITY OF THE ENVIRONMENT

Around the turn of the century the industrial complex of Electric (Horr) stretched from the base of Cinnabar Mountain to the YNP boundary. Today, there are mere traces of the town's existence. Yet, man's imprint on the landscape can last for generations.

The Church's proposed developments will change the nature of the land, and, during the construction phase, could lead to short term degradation if proper construction practices are not used. After the building phase, maintenance of the structures and grounds should prevent any long-term impacts to the environment.

The new development will displace some small animals and replace native plants and grasses with residential-type flora; however, this will be relatively limited since efforts have been made to keep developed areas on RTR-S in clusters. This style of development results in minimal use of land for facilities and dedicates the majority of the land for cultivation or open space.

Since one of the factors which led to the purchase of the property was its scenic setting, it's reasonable to believe the Church is as interested in minimizing short and long-term impacts and will work toward establishing environmental practices aimed at maintaining the health and beauty of the area.

One long-term challenge will be to successfully manage large numbers of people for short periods of time. The outdoor summer conference and the classes and courses to be taught at the Spring Creek site will require sound planning and proper management to prevent impacts to the human and physical environments.

ALTERNATIVES

In a discussion of alternatives, it is important to remember that the primary decision before the DHES relates to the approval of plans and speci-

fications for public water and wastewater systems and the issuance of licenses for work camps at several locations. The alternatives are summarized as follows:

(1) DENY ALL LICENSES AND APPROVALS-

This alternative would effectively limit any additional development of this nature on the Church's property. That is not to say that selection of this alternative would result in elimination of the Church's presence from Park County. With the possible exception of the central kitchen facility at the Big Spur Campground, no existing facilities would be removed or changed if this alternative were selected.

The rural nature of this area would remain unchanged from what exists at this time. All of the impacts identified in this document, however slight, would be avoided.

The Church would be required to develop an alternate plan to provide the necessary services for continued operation of the Church's headquarters in Park County. Local economies will not benefit from the purchase of goods and services necessary for the development and operation of this facility.

In order for this alternative to be selected, DHES would be required to show that significant and unacceptable environmental impacts would occur or that engineering and public health standards would not be met. The information that has been assembled and contained in this draft document does not indicate this to be the case.

MEPA does not prohibit an agency from approving a proposal that has significant impacts, but does require agencies to take a "hard look" at those possible impacts.

(2) UNCONDITIONALLY APPROVE ALL LICENSES AND PLANS AND SPECIFICATIONS-

As one can readily see from the information contained in this document, a development of this varied nature and magnitude cannot occur without environmental impact. To approve, in total, the engineering plans and issue appropriate licenses would allow the Church to proceed with all development plans. The Church would be able to accommodate within its' holdings, all Church members employed by the them. The local economy would benefit from the purchase of goods and services needed to implement the proposed development plans. Local governments would realize increased taxes from the improvements that occur and from salaries paid to Church employees.

This alternative would, however, place some demand on local services. Services such as law enforcement, planning and schools will be impacted to varying degrees as discussed elsewhere in this document. The increased activity associated with this development will, without mitigation, impact area wildlife both in harassment and habitat loss. With complete unconditional development there will be some aesthetic changes in the area and in particular, the Corwin Springs area.

Although many of the impacts identified in this document are secondary and would be an indirect result of the DHES decision on the plans and

specifications and licenses, the selection of this alternative would seemingly ignore its responsibility under the Montana Environmental Policy Act to make environmentally informed decisions.

(3) Modify or Conditionally Approve the Licenses and the Plans and Specifications -

Given the fact that the proposed development includes a number of individual and distinctly separate actions, the DHES would have the option of imposing specific conditions and requirements on each of the required approval or licensing actions. This document does not attempt to evaluate the impacts of all the varied scenarios that could be developed from differing combinations of individual actions. The department is not in a position to dictate to the Church the location of the work camps or facilities requiring approval of water or wastewater systems as long as public health and engineering standards are met.

Modification or conditional approval of the licenses or plans and specification approval would not appear to significantly change the environmental impact.

(4) Approve all Licenses and Plans And Specifications Subject to Implementation of a Mitigation Plan for Indirect or Secondary Impacts -

The discussion of alternative #2, indicates that without some mitigative efforts there could be unacceptable adverse environmental impact. The draft EIS identifies these mitigative measures as it discusses the major issues. Many of the mitigative measures relate to areas outside of the regulatory authority and responsibility of the DHES but seem crucial to an environmentally sensitive implementation of the planned development. Selection of this alternative would require that the mitigation efforts be completed. The major mitigation efforts that would be required are summarized as follows:

1) Utilization of a site plan that will allow housing and work units to be clustered in small units, minimizing loss of productive land, impacts on wildlife and preserving aesthetics of the area.

2) Implementation of a road improvement and dust control program, undertaken jointly with Park County. Car pooling and other methods of common transportation should be utilized.

3) Solid waste from the slaughterhouse operation will be removed from the site at the conclusion of processing to a properly licensed disposal area outside of the immediate area.

4) Domestic sheep will not be allowed to use the winter range of the bighorn sheep herd on Cinnabar Mountain to minimize the potential of disease transmission.

5) Construction of a bear proof fence around the tree farm and the root crop fields.

6) Any composting of vegetation be moved to Church property away from

the RTR-S where there is little likelihood of bear problems developing.

7) Implementation of a sediment control plan for all developed areas where the natural vegetative protective covering is removed.

8) Minimum instream flows be maintained in Reese Creek, Mol Heron Creek, and Cedar Creek.

9) A catch and release program be developed with the assistance of the DFWP for the upper section of Mol Heron Creek during that time of the year when the outdoor conference will be held.

10) Monitoring of the groundwater impact of the wastewater disposal system serving the shower and toilet facility on Mol Heron Creek. If adverse impact is identified an alternate method of wastewater disposal be implemented with approval of the Park County Health Department and if appropriate, the DHES.

11) Best management practices be utilized in all aspects of agricultural production.

12) The geothermal well drilled to tap the aquifer serving La Duke Hot Springs not be developed or utilized until a change in the point of diversion and place of use is approved by DNRC under Montana Water Law.

13) Monitoring of the groundwater impact of the proposed new wastewater facility serving the East Gate work camp. If adverse impact is identified, an alternative method of wastewater disposal be implemented with approval of the Park County Health Department and if appropriate, the DHES.

14) Monitoring of the groundwater impact of the existing wastewater facility serving the Ranch Headquarters. If adverse impact is identified, an alternative method of wastewater disposal be implemented with approval of the Park County Health Department and if appropriate, the DHES.

15) Monitoring and reporting of flows at all wastewater systems previously approved and all systems that will be approved by DHES. Flows in excess of design parameters will require system modification with DHES and Park County Health Department approval.

16) Sand lining of the drainfield trenches for the proposed wastewater systems at the East Gate Work Camp and at Ranch Headquarters.

The selection of this alternative would have many of the benefits listed in the discussion of alternative #2 without the environmental costs associated with that alternative. The Church would be able to proceed with its development plans but would be constrained to proceed in accordance with the above listed mitigative measures.

RECOMMENDATIONS

The DHES recommends that Alternative #4 be selected. The review of available information indicates that the proposed water and wastewater systems are adequate from a public health and engineering standpoint and will not have a measurable impact on water quality. Likewise, the application for work camp licenses is adequate and the issuance will have no adverse impact. It is the indirect and secondary impacts that are of greatest concern in this matter. While DHES does not have specific statutory authority in this area, it is the department's opinion that the proposed development plan can only be implemented without adverse environmental impact if the mitigative measures identified in this report and summarized in the discussion of Alternative # 4 are incorporated in the plan. The DHES will be conducting periodic announced and unannounced inspections to evaluate performance of the water and wastewater systems and to verify wastewater flow data.

It is important to point out that many of the mitigative measures have already been agreed to or in some cases even implemented by the Church. Other measures that have been identified will require coordination and cooperation with other state and local agencies but must be initiated by representatives of the Church.

It is the department's opinion that while implementation of the proposed development plan will obviously be a change for the area, and the Corwin Springs area in particular, the environment will be adequately protected by the review and approval of specific projects provided by the DHES and the implementation of the mitigative measures.

APPENDICES

APPENDIX 1

BIRDS

* Birds of Special Interest or Concern found in Latilong 39.

<u>Common Name</u>	<u>Scientific Name</u>
Common loon	<i>Gavia immer</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Horned grebe	<i>Podiceps auritus</i>
Red-necked grebe	<i>P. grisegena</i>
Eared grebe	<i>P. nigricollis</i>
Western grebe	<i>Aechmophorus occidentalis</i>
American white pelican	<i>Pelecanus erythrorhynchos</i>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
American bittern	<i>Botaurus lentiginosus</i>
Great blue heron	<i>Ardea herodias</i>
Cattle egret	<i>Bubulcus ibis</i>
Black-crowned night-heron	<i>Nycticorax nycticorax</i>
Tundra swan	<i>Cygnus columbianus</i>
Trumpeter swan	<i>C. buccinator</i>
Mute swan	<i>C. olor</i>
Snow goose	<i>Chen caerulescens</i>
Canada goose	<i>Branta canadensis</i>
Wood duck	<i>Aix sponsa</i>
Green-winged teal	<i>Anas crecca</i>
American black duck	<i>A. rubripes</i>
Mallard	<i>A. platyrhynchos</i>
Northern pintail	<i>A. acuta</i>
Blue-winged teal	<i>A. discors</i>
Cinnamon teal	<i>A. cyanoptera</i>
Northern shoveler	<i>A. clypeata</i>
Gadwall	<i>A. strepera</i>
American wigeon	<i>A. americana</i>
Canvasback	<i>Aythya valisineria</i>
Redhead	<i>A. americana</i>
Ring-necked duck	<i>A. collaris</i>
Lesser scaup	<i>A. affinis</i>
*Harlequin duck	<i>Histrionicus histrionicus</i>
Oldsquaw	<i>Clangula hyemalis</i>
Common goldeneye	<i>Bucephala clangula</i>
Barrow's goldeneye	<i>B. islandica</i>
Bufflehead	<i>B. albeola</i>
Hooded merganser	<i>Lophodytes cucullatus</i>
Common merganser	<i>Mergus merganser</i>
Red-breasted merganser	<i>M. serrator</i>
Ruddy duck	<i>Oxyura jamaicensis</i>
Turkey vulture	<i>Cathartes aura</i>
*Osprey	<i>Pandion haliaetus</i>
*Bald eagle	<i>Haliaeetus leucocephalus</i>

BIRDS

* Birds of Special Interest or Concern found in Latilong 39.

<u>Common Name</u>	<u>Scientific Name</u>
Northern harrier	Circus cyaneus
Sharp-shinned hawk	Accipiter striatus
*Cooper's hawk	A. cooperii
*Northern goshawk	A. gentilis
Broad-winged hawk	Buteo platypterus
Swainson's hawk	B. swainsoni
Red-tailed hawk	B. jamaicensis
*Ferruginous hawk	B. regalis
Rough-legged hawk	B. lagopus
*Golden eagle	Aquila chrysaetos
American kestrel	Falco sparverius
*Merlin	F. columbarius
*Peregrine falcon	F. peregrinus
Gyr falcon	F. rusticolus
*Prairie falcon	F. mexicanus
Gray partridge	Perdix perdix
Ring-necked pheasant	Phasianus colchicus
Blue grouse	Dendragapus obscurus
Ruffed grouse	Bonasa umbellus
Sage grouse	Centrocercus urophasianus
Sharp-tailed grouse	Tympanuchus phasianellus
Wild turkey	Meleagris gallopavo
Virginia rail	Rallus limicola
Sora	Porzana carolina
American coot	Fulica americana
Sandhill crane	Grus canadensis
Killdeer	Charadrius vociferus
American avocet	Recurvirostra americana
Lesser yellowlegs	Tringa flavipes
Solitary sandpiper	T. solitaria
Willet	Catoptrophorus semipalmatus
Spotted sandpiper	Actitis macularia
*Upland sandpiper	Bartramia longicauda
*Long-billed curlew	Numenius americanus
Marbled godwit	Limosa fedoa
Semipalmated sandpiper	Calidris pusilla
Least sandpiper	C. minutilla
Baird's sandpiper	C. bairdii
Common snipe	Gallinago gallinago
Wilson's phalarope	Phalaropus tricolor
Red-necked phalarope	P. lobatus
Franklin's gull	Larus pipixcan
Bonaparte's gull	L. philadelphia
Ring-billed gull	L. delawarensis
California gull	L. californicus
Common tern	Sterna hirundo
Forster's tern	S. forsteri
Rock dove	Columba livia

BIRDS

* Birds of Special Interest or Concern found in Latilong 39.

<u>Common Name</u>	<u>Scientific Name</u>
Mourning dove	Zenaida macroura
Black-billed cuckoo	Coccyzus erythrophthalmus
Great horned owl	Bubo virginianus
Snowy owl	Nyctea scandiaca
*Northern pygmy-owl	Glaucidiumgnoma
*Burrowing owl	Athene cunicularia
*Great gray owl	Strix nebulosa
*Long-eared owl	Asio otus
Short-eared owl	A. flammeus
Boreal owl	Aegolius funereus
*Northern saw-whet owl	A. acadicus
Common nighthawk	Chordeiles minor
Common poorwill	Plalaenoptilus nuttallii
Chimney swift	Chaetura pelagica
White-throated swift	Aeronautes saxatilis
Calliope hummingbird	Stellula calliope
Broad-tailed hummingbird	Selasphorus platycercus
Rufous hummingbird	S. rufus
Belted kingfisher	Ceryle alcyon
Lewis' woodpecker	Melanerpes lewis
Red-headed woodpecker	M. erythrocephalus
Yellow-bellied sapsucker	Sphyrapicus varius
Williamson's sapsucker	S. thyroidus
Downy woodpecker	Picoides pubescens
Hairy woodpecker	P. villosus
Three-toed woodpecker	P. tridactylus
Black-backed woodpecker	P. arcticus
Northern flicker	Colaptes auratus
*Olive-sided flycatcher	Contopus borealis
Western wood-pewee	C. sordidulus
Willow flycatcher	Empidonax traillii
Least flycatcher	E. minimus
Hammond's flycatcher	E. hammondii
Dusky flycatcher	E. oberholseri
Western flycatcher	E. difficilis
Say's phoebe	Sayornis saya
Western kingbird	Tyrannus verticalis
Eastern kingbird	T. tyrannus
Horned lark	Eremophila alpestris
Tree swallow	Tachycineta bicolor
Violet-green swallow	T. thalassina
Northern rough-winged swallow	Stelgidopteryx serripennis
Bank swallow	Riparia riparia
Cliff swallow	Hirundo pyrrhonota
Barn swallow	Hirundo rustica
Gray jay	Perisoreus canadensis
Steller's jay	Cyanocitta stelleri
Blue jay	C. cristata

BIRDS

* Birds of Special Interest or Concern found in Latilong 39.

<u>Common Name</u>	<u>Scientific Name</u>
Pinyon jay	Gymnorhinus cyanocephalus
Clark's nutcracker	Nucifraga columbiana
Black-billed magpie	Pica pica
American crow	Corvus brachyrhynchos
Common raven	Corvus corax
Black-capped chickadee	Parus atricapillus
Mountain chickadee	Parus gambeli
Red-breasted nuthatch	Sitta canadensis
White-breasted nuthatch	S. carolinensis
Pygmy nuthatch	S. pygmaea
Brown creeper	Certhia americana
Rock wren	Salpinctes obsoletus
Canyon wren	Catherpes mexicanus
House wren	Troglodytes aedon
Winter wren	T. troglodytes
American dipper	Cinclus mexicanus
Golden-crowned kinglet	Regulus satrapa
Ruby-crowned kinglet	R. calendula
*Eastern bluebird	Sialia sialis
Mountain bluebird	S. currucoides
Townsend's solitaire	Myadestes townsendi
Veery	Catharus fuscescens
Swainson's thrush	Catharus ustulatus
Hermit thrush	C. guttatus
American robin	Turdus migratorius
Gray catbird	Dumetella carolinensis
Sage thrasher	Oreoscoptes montanus
Water pipit	Anthus spinoletta
Bohemian waxwing	Bombycilla garrulus
Cedar waxwing	B. cedrorum
Northern shrike	Lanius excubitor
European starling	Sturnus vulgaris
Solitary vireo	Vireo solitarius
Warbling vireo	V. gilvus
Red-eyed vireo	V. olivaceus
Orange-crowned warbler	Vermivora celata
Nashville warbler	V. ruficapilla
Yellow warbler	Dendroica petechia
Yellow-rumped warbler	D. coronata
Townsend's warbler	D. townsendi
American redstart	Setophaga ruticilla
Ovenbird	Seiurus aurocapillus
Northern waterthrush	S. noveboracensis
Macgillivray's warbler	Oporornis tolmiei
Common yellowthroat	Geothlypis trichas
Wilson's warbler	Wilsonia pusilla
Yellow-breasted chat	Icteria virens
Scarlet tanager	Piranga olivacea

BIRDS

* Birds of Special Interest or Concern found in Latilong 39.

<u>Common Name</u>	<u>Scientific Name</u>
Western tanager	<i>P. ludoviciana</i>
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
Black-headed grosbeak	<i>P. melanocephalus</i>
Lazuli bunting	<i>Passerina amoena</i>
Indigo bunting	<i>P. cyanea</i>
Green-tailed towhee	<i>Pipilo chlorurus</i>
Rufous-sided towhee	<i>P. erythrophthalmus</i>
American tree sparrow	<i>Spizella arborea</i>
Chipping sparrow	<i>S. passerina</i>
*Clay-colored sparrow	<i>Spizella pallida</i>
*Brewer's sparrow	<i>S. breweri</i>
Vesper sparrow	<i>Poocetes gramineus</i>
Lark sparrow	<i>Chondestes grammacus</i>
Sage sparrow	<i>Amphispiza belli</i>
Lark bunting	<i>Calamospiza melanocorys</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Fox sparrow	<i>P. iliaca</i>
Song sparrow	<i>Melospiza melodia</i>
Lincoln's sparrow	<i>M. lincolni</i>
White-throated sparrow	<i>Zonotrichia albicollis</i>
White-crowned sparrow	<i>Z. leucophrys</i>
Harris' sparrow	<i>Z. querula</i>
Dark-eyed junco	<i>J. hyemalis</i>
Dark-eyed junco (gray-headed)	<i>J. hyemalis caniceps</i>
Lapland longspur	<i>C. lapponicus</i>
Snow bunting	<i>Plectrophenax nivalis</i>
*Bobolink	<i>Dolichonyx oryzivorus</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Western meadowlark	<i>Sturnella neglecta</i>
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>
Rusty blackbird	<i>Euphagus carolinus</i>
Brewer's blackbird	<i>E. cyanocephalus</i>
Common grackle	<i>Quiscalus quiscula</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Northern oriole	<i>Icterus galbula</i>
Rosy finch (gray-crowned)	<i>Leucosticte arctoa tephrocotis</i>
Rosy finch (black)	<i>L. arctoa atrata</i>
Pine grosbeak	<i>Pinicola enucleator</i>
Purple finch	<i>Carpodacus purpureus</i>
Cassin's finch	<i>C. cassinii</i>
House finch	<i>C. mexicanus</i>
Red crossbill	<i>Loxia curvirostra</i>
White-winged crossbill	<i>L. leucoptera</i>
Common redpoll	<i>Carduelis flammea</i>
Pine siskin	<i>C. pinus</i>
American goldfinch	<i>C. tristis</i>
Evening grosbeak	<i>Coccothraustes vespertinus</i>
House sparrow	<i>Passer domesticus</i>

AMPHIBIANS

* Species of Special Interest or Concern found in Latilong 39.

<u>Common Name</u>	<u>Scientific Name</u>
Boreal (western) toad	Bufo boreas
Boreal chorus frog	Pseudacris triseriata
Spotted frog	Rana pretiosa

REPTILES

Snapping turtle	Chelydra serpentina
Sagebrush lizard	Sceloporus graciosus
Rubber boa	Charina bottae
Racer	Coluber constrictor
Common garter snake	Thamnophis sirtalis
Western garter snake	T. elegans
Prairie rattlesnake	Crotalus viridis

MAMMALS

Masked shrew	Sorex cinereus
Montane shrew	S. monticola
Water shrew	S. palustris
Little brown myotis	Myotis lucifugus
Pika	Ochotona princeps
Nuttall's cottontail	Sylvilagus nuttallii
Snowshoe rabbit	Lepus americanus
White-tailed jackrabbit	L. townsendii
Least chipmunk	Eutamias minimus
Yellow-pine chipmunk	E. amoenus
*Uinta chipmunk	E. umbrinus
Yellow-bellied marmot	Marmota flaviventris
Richardson's ground squirrel	Spermophilus richardsonii
Uinta ground squirrel	S. armatus
Golden-mantled ground squirrel	S. lateralis
Black-tailed prairie dog	Cynomys ludovicianus
Fox squirrel	Sciurus niger
Red squirrel	Tamiasciurus hudsonicus
Northern flying squirrel	Glaucomys sabrinus
Northern pocket squirrel	Thomomys talpoides
Beaver	Castor canadensis
Deer mouse	Peromyscus maniculatus
Bushy-tailed woodrat	Neotoma cinerea
Gapper's red-backed vole	Clethrionomys gapperi
Heather vole	Phenacomys intermedius
Meadow vole	Microtus pennsylvanicus
Montane vole	M. montanus
Long-tailed vole	M. longicaudus

MAMMALS

* Species of Special Interest or Concern found in Latilong 39.

<u>Common Name</u>	<u>Scientific Name</u>
Prairie vole	M. ochrogaster
Water vole	M. richardsoni
Sagebrush vole	Lagurus curtatus
Muskrat	Ondatra zibethicus
House mouse	Mus musculus
Western jumping mouse	Zapus princeps
Porcupine	Erethizon dorsatum
Coyote	Canis latrans
Red fox	Vulpes vulpes
Black bear	Ursus americanus
*Grizzly bear	Ursus arctos
Raccoon	Procyon lotor
Marten	Martes americana
Ermine	Mustela erminea
Least weasel	M. nivalis
Long-tailed weasel	M. frenata
Mink	M. vison
*Wolverine	Gulo luscus
Badger	Taxidea taxus
Striped skunk	Mephitis mephitis
River otter	Lutra canadensis
Mountain lion	Felis concolor
*Lynx	Lynx canadensis
Bobcat	L. rufus
Elk	Cervus elaphus
Mule deer	Dama hemionus
White-tailed deer	Dama virginianus
Moose	Alces alces
Pronghorn	Antilocapra americana
Bison	Bison bison
Mountain goat	Oreamnos americanus
Mountain sheep	Ovis canadensis

Appendix 2. Density (number/square foot) of macroinvertebrates in Reese Creek, 1986 (Mahoney, Draft Report 1987).

	-----Reach-----						
	1	2	3	4	5	6	
Turbellaria (planarians)				4			
Annelida				12			
Hydracarina (water mites)						1	
Stenelmis sp.					4		
Chironomidae	1			2		3	
Glutops sp.				6	1		
Baetis bicaudatus	5	1	8	1	4	1	
Drunella coloradensis	10	2	1		13		
Ephemerella alleni					1		
Cinygmula sp.	1	3	1		10		
Epeorus grandis		1					
Ameletus sp.				1	8		
Chloroperlidae					2	2	
Arctopsyche grandis		1					
Lepidostoma sp.				1			
Apatania sp.		19	12	7	1		
Neothremma alicia			2				
Rhyacophila sp.		3			1	1	
Pisidium sp.				1			
taxa/square foot	4	7	5	9	10	5	Total
Total number/square foot	17	30	24	35	45	8	

Appendix 3

NONFORESTED TYPES

Dry Grassland and Meadow

These sites are found at the lower elevations on side hills, flats and rounded hills usually with a southerly exposure. Vegetation cover is moderate to sparse and bare ground is common. The characteristic grassland habitat types found are Idaho fescue/bluebunch wheatgrass, Idaho fescue/-Richardson's needlegrass and bluebunch wheatgrass/Sandberg's bluegrass.

Moist and Wet Grassland and Meadow

Moist meadows occur on gently rolling ground often on protected aspects. Grasses and forbs are usually abundant. Idaho fescue/awned wheatgrass and Idaho fescue/tufted hairgrass habitat types are typical.

The wetter components are less extensive and occur at somewhat higher elevations in concave positions or where subsurface moisture accumulates. These areas are wet or moist throughout the growing season. Cover is dense and diverse. The tufted hairgrass and alpine timothy series and the water sedge/tufted hairgrass, water sedge/elephant's head and Nebraska sedge/Baltic rush habitat types are characteristic.

Moist and Dry Shrublands

The moister shrubland sites are found at higher elevations on benches, flood plains and hillsides with a northerly exposure. Big sage/Idaho fescue, shrubby cinquefoil/Idaho fescue, silver sage/Idaho fescue, silver sage/small-winged sedge and silver sage/water sedge are typical habitat types.

The drier sites are found at lower elevations on rolling or smooth topography and south-facing exposed slopes. Bare ground is common. Big sage/Idaho fescue, big sage/bluebunch wheatgrass and three-tipped sage/Idaho fescue are typical habitat types. Bitterbrush/bluebunch wheatgrass and bitterbrush/Idaho fescue occur to a lesser extent.

FORESTED TYPES

Dry Douglas Fir Types

These sites are found on northern slopes at the midelevations and on southerly aspects at higher elevations. Douglas fir is the dominant tree species. Douglas fir/Idaho fescue and Douglas fir/bluebunch wheatgrass are typical habitat types. Sagebrush shrublands are often associated in a mosaic pattern.

Cool Douglas Fir Types

These sites are found adjacent to or above the dry Douglas fir types where microclimate conditions are cooler and somewhat more moist. Lodgepole pine is the dominant seral component. Whitebark pine occurs in the higher

elevation stands. Douglas fir/pinegrass is the dominant habitat type. Douglas fir/common juniper is an important inclusion transitional to the drier and warmer Douglas fir types.

Dry Subalpine Fir Types

These sites are adjacent to the moist Douglas fir types where conditions are moist and cool enough to support subalpine fir. Subalpine fir/-pinegrass and subalpine fir/grouse whortleberry are characteristic habitat types. In the former, Douglas fir and lodgepole pine are the dominant overstory (the tall trees in a forest) species. In the latter, lodgepole pine dominates the overstory. Other stands are dominated by Engelmann spruce and subalpine fir.

Moist Subalpine Fir and Spruce Types

These sites are found at the mid- and upper elevations on cool, moist north-facing slopes and benches. In the subalpine fir/twinflower habitat type, lodgepole pine is the dominant timber species. The spruce/twinflower habitat types lack subalpine fir and are dominated by lodgepole pine.

Upper Subalpine Types

These sites are found at the higher elevations. The dry, cold site conditions restrict growth. The subalpine fir-whitebark pine-grouse whortleberry habitat type is typical.

OTHER COMPONENTS

Rocky Areas

These areas are composed of exposed bedrock, talus or scree slopes, or cliff areas. Vegetation on these sites is nonexistent or sparse.

Developed Lands

These sites have been modified such that the native vegetation is eliminated or greatly reduced. Agricultural development is the predominant use and includes hay meadows, pasture and cropland.

Riparian Areas

Riparian areas occur as stringers along perennial stream courses. These plant communities tend to be diverse and are composed of water-loving plants such as cottonwoods, willows and sedges. Due to their limited areal extent, they were not mapped.

Aspen Copses

These areas are distinct and important inclusions in other types. Quaking aspen dominates the overstory. Due to their limited areal extent, they were not mapped.

REFERENCES

- Abbott Laboratories. 1978. Dipel: Abiological Insecticide - Technical Manual. Abbott Laboratories, North Chicago, Illinois. 34 pp.
- Alley, H.P., P.K. Fay, C.A. Lacey, R.G. Lym, B. Maxwell and C.G. Messersmith. 1985. Leafy Spurge - Distribution, Biology and Control, Circular 309, Cooperative Extension Service, Montana State University, Bozeman, Montana. 14 pp.
- Alt, David D. and Donald W. Hyndman. 1972. Roadside Geology of the Northern Rockies. Mountain Press Publishing Company, Missoula, MT.
- _____. 1986. Roadside Geology of Montana. Mountain Press Publishing Company, Missoula, MT.
- Antevs, E. 1948. Climatic changes and pre-white man, the great basin with emphasis on glacial and postglacial times. University of Utah Bulletin, Vol. 38, No. 20, Salt Lake City, UT.
- _____. 1955. Geologic and climatic dating in the west. American Antiquity, Vol. 20, No. 4.
- Arthur, G. 1966. An Archaeological survey of the upper Yellowstone River drainage, MT. Montana State University Agricultural Economics Research Report No. 26, Bozeman, MT.
- Associated Press. 1987. "Church, Critics Exchange Jibes," Independent Record, Helena, MT, February 5.
- Averett and McPhee. 1971. Distribution and growth of indigenous fluvial and adfluvial cutthroat trout, St. Joe River, Idaho. Northwest Science 45(1):38-47.
- Bahls, L., M. Fillinger, R. Greene, A. Horpestad, G. Ingman and E. Weber. 1981. Biological Water Quality Monitoring: Eastern Montana, 1979. Montana Department of Health and Environmental Sciences. 93 pp.
- Barbee, R. Superintendent, Yellowstone National Park. Letter to Jim Flynn, Director MDFWP, regarding pronghorn depredation hunt, 1986.
- Basile, J. 1982. Grizzly bear distribution in the Yellowstone area, 1973-1979. USDA-Forest Service, Intermtn. Forest and Range Experiment Station, Research Note INT-321.
- Beese, R. March 3, 1987 letter concerning the bridge at Corwin Springs to Commissioner Carlo Cieri, Park County Commission, Livingston, Montana.
- Behnke, R. J. 1987. Yellowstone cutthroat. Trout 1987 (Winter):42-47.
- Bell, D. 1977. "The Return of the Sacred? The Argument on the Future of Religion," British Journal of Sociology, 28 (4), 419-44 pp.
- Benedict J.B. 1978. Getting away from it all during the two-drought

altithermal: the Colorado Front Range. Paper presented at the 36th Annual Plains Conference, Denver, CO.

_____. 1973. Prehistoric man and climate: the view from timberline. Abstracts IX INQUA Congress. Christ Church, New Zealand.

Bennett, D.D. and K.E. Gibson. 1985. "Carbaryl Prevents Attacks on Lodgepole Pine by the Mountain Pine Beetle," Journal of Forestry, Volume 83, Number 2, February 1985. 109-111 pp.

Berg, R. K. 1975. Fish and Game Planning, Upper Yellowstone and Shields River Drainages. MDFWP. Federal Aid to Fish and Wildlife Restoration Project FW-3-R. 125 p.

Bergantino, R.N., S. Kovacich and J.L. Sonderegger, 1981. Tables for Geothermal Resources Map of Montana. Montana Bureau of Mines and Geology Hydrogeologic Map 3, Montana Bureau of Mines and Geology, Montana College of Mineral Science and Technology, Butte, MT.

Berto, B. November 30, 1987 letter concerning the history of planning activities in Park County as it related to the Church Universal and Triumphant to Tom Ellerhoff, Environmental Sciences Division, Department of Health and Environmental Sciences, Helena, MT.

Biggins, D. 1977. Effects of coal strip mining on habitat use and activity patterns of mule deer (*Odocoileus hemionus*) and white-tailed deer (*O. virginianus*). Unpublished Progress Report, Denver Wildlife Research Center, Sheridan, Wyoming.

Birkby, J. and S. Pearlmutter. 1980. Montana Geothermal Handbook. Montana Department of Natural Resources and Conservation, Helena, MT. 93 pp.

Bothwell, M.L. 1985. Phosphorus limitation of lotic periphyton growth rates: An intersite comparison using continuous-flow troughs (Thompson River system, British Columbia). Limnology and Oceanography 30(3):527-542.

Brelsford, D.L, P.E. 1987. Dust Suppression on Royal Teton Ranch Roads-Corwin Springs, Park County, Montana - Preliminary Engineering and Economic Analysis. Brelsford Engineering, Inc., Bozeman, Mt. 40 pp.

Broadwater County Historical Society. 1977. Broadwater Bygones. A History of Broadwater County. Broadwater County Historical Society. Color World of Montana, Inc., Bozeman, MT.

Bromley, D. and A. Shupe. 1981. Strange Gods. Boston: Beacon Press.

Bryson, R.A., D. Baerris and W.M. Wendland. 1970. The character of late-glacial and post-glacial climatic changes: In Pleistocene and Recent Environments of the Central Great Plains, edited by W. Dort and J.K. Jones, pp. 53-73. University of Kansas Press, Lawrence.

Campbell, M.R. 1912. Contributions to economic geology (short papers and preliminary reports) 1910, Part II. Mineral fuels. Department of the

Interior, United States Geological Survey Bulletin 471. Washington.

Cheney, R. and C. Erskine. 1978. Music, Saddles and Flapjacks: Dudes at the OTO Ranch. Mountain Press Publishing Company. Missoula, MT.

Chrest, H. 1985. Job Progress Report for the Montana Department of Fish, Wildlife and Parks, Helena, MT.

_____ and Herbert. 1985. Job Progress Report for the Montana Department of Fish, Wildlife and Parks, Helena, MT.

Clancy, Chris. Fisheries biologist, MDFWP. Personal communication, 1987.

Cole, G. 1976. Management involving grizzly and black bears in Yellowstone National Park, 1970-1975. Natural Resources Report No. 9. U. S. National Park Service. 26 p.

Constan, K. J. 1972. Winter foods and range use of three species of ungulates. Journal of Wildlife Management 36(4):735-42.

_____. 1975. Fish and game planning, Upper Yellowstone and Shields River drainages. Federal Aid to Fish and Wildlife Restoration Project FW-3-R, Montana Dept. of Fish, Wildlife and Parks. 125 p.

Cooper and Jacob. 1946. A generalized Graphical Method for Evaluating Formation Constants and Summarizing Well-Field History: American Geophysical Union. Transactions, Volume 27, No. 4.

Craighead, J. J., G. Atwell, and B. W. O'Gara. 1972. Elk migrations in and near Yellowstone National Park. Wildlife Monograph No. 29. 48 p.

Department of Civil Engineering and Engineering Mechanics 1979. "The Effects of Non-Sewered Subdivisions on Ground Water Quality", Montana State University.

Despain, D., D. Houston, M. Meagher, P. Schullery. 1986. Wildlife in Transition - Man and Nature on Yellowstone's Northern Range. Roberts Rinehart, Inc. 142 pp.

Dodson. 1985. Notarized affidavit - Fishery.

Driscoll, P. Environmental engineer for the Montana Department of Health and Environmental Sciences-Air Quality Bureau. Personal communication, 1987.

Ellerhoff, T.M. November 16, 1987 letter to Ben Berto, Planning Director, City-County Planning Office, Park County, Livingston, MT.

Ellig, L. September 2, 1987 memorandum concerning Fish and Wildlife Comments on the Royal Teton Ranch EIS to Tom Ellerhoff, Environmental Sciences Division, Department of Health and Environmental Sciences, Helena, MT.

Fillinger, M. 1982. Aquatic invertebrate study, Jardine area, Montana.

Prepared for Homestake Mining Company, Golden, CO. Mine permit application. 43 p.

- Flath, D. 1984. Vertebrate species of special interest or concern. Montana Dept. of Fish, Wildlife and Parks, Wildlife Division, Helena, MT. 76 p.
- Foose, R.M., D.U. Wise and G.S. Garbarini. 1961. Structural geology of the Beartooth Mountains, Montana and Wyoming: Geological Society American Bulletin, V. 72, No. 8, p. 1143-1172.
- Foss, A. 1986. Job Progress Report for Montana Department of Fish, Wildlife and Parks, Helena, MT.
- _____. Biologist, Montana Department of Fish, Wildlife and Parks, Helena, MT. Personal communication-Wildlife, 1987.
- Francis, E. November 17, 1986 letter concerning preliminary environmental review information to Steve Pilcher, Water Quality Bureau Chief, Montana Department of Health and Environmental Sciences, Helena, MT.
- _____. August 7, 1987 letter concerning tree discoloration along Mol Heron Road to the Park County Commissioners, Livingston, MT.
- _____. March 26, 1987 letter concerning the 1986 Western Spruce Budworm Treatment Program on the Royal Teton Ranch to Jim Melstad, P.E., Water Quality Bureau, Montana Department of Health and Environmental Sciences, Helena, MT.
- _____. March 24, 1987 letter concerning the Corwin Springs Bridge to Jim Melstad, P.E., Water Quality Bureau, Montana Department of Health and Environmental Sciences, Helena, MT.
- _____. Personal communication-Wildlife, 1987.
- _____. Business Manager, Church Universal and Triumphant. September 30, 1985 letter to LeRoy Ellig, Regional Supervisor, Montana Department of Fish, Wildlife and Parks, Bozeman, MT.
- _____. Business manager for the Church Universal and Triumphant. Personal communication-Vegetation, 1987.
- _____. April 4, 1987 letter to S. Gilbert, Biologist, OEA Research, Helena, MT.
- _____. March 25, 1987 letter to S. Gilbert, Biologist, OEA Research, Helena, MT.
- _____. 1987. Personal communication - Historical and Archaeological. Corwin Springs, MT.
- _____. July 14, 1987 testimony concerning a geothermal project being planned by the Church Universal and Triumphant to the U.S. Senate Subcommittee on Mineral Resource Development and Projection, Washington,

D.C.

- _____. January 16, 1987 letter to J. Flynn, Director of Montana Department of Fish, Wildlife and Parks, Helena, MT.
- _____. April 27, 1987 letter concerning a proposed cooperative agreement for Royal Teton Ranch Roads to the Park County Commissioners, Livingston, MT.
- _____. November 17, 1986 letter to Steve Pilcher, Water Quality Bureau Chief, Montana Department of Health and Environmental Sciences, Helena, MT.
- Fraser, G.D., H.A. Waldrop and H.J. Hyden. 1969. Geology of the Gardiner area, Park County, Montana: U.S. Geological Survey Bulletin 1277, 118 p.
- French, R.A. and J.R. Lacey. 1983. Knapweed - Its Cause, Effect and Spread in Montana, Circular 307, Cooperative Extension Service, Montana State University, Bozeman, MT. 13 pp.
- _____. and J. Lacey. 1983. Knapweed: its cause, effect and spread in Montana. Montana State University Cooperative Extension Service Circular #307, Bozeman, MT. 13 pp.
- Frison G. 1982. Cultural resource files. Supervisors Office, Gallatin National Forest, Bozeman, MT.
- _____. 1976. Crow pottery in northern Wyoming. Plains Anthropologist 21(71).
- _____. and D.C. Grey. 1980. Pryor Stemmed: A Specialized Paleo-Indian Ecological Adaptation. Plains Anthropologist 25(87):27-46.
- _____. 1978. Prehistoric Hunters of the High Plains. New York: Academic Press.
- Gibson, K.E. Management Recommendations for Douglas-Fir Stands Infested By Western Spruce Budworm on the Royal Teton Ranch - Corwin Springs, MT. 3 pp.
- Gordon, M.J. 1987. "Church Universal and Triumphant," Chapter 17, Ancient Wisdom Family, The Encyclopedia of American Religions, Gale Research Company, Detroit, Michigan. 620-621 pp.
- Greeley, A. 1972. The Denominational Society. New York: Scott, Foresman, and Company.
- Hadley, K. 1984. Status report on the Yellowstone cutthroat trout (*Salmo clarki bouvieri*) in Montana. Prepared for MDFWP, Helena, MT. 74 p.
- Haines, A.L. 1977. The Yellowstone Story, 2 volumes, Yellowstone Library and Museum Association and Colorado Associated University Press.

- Hansen, G. 1987. Engineer with Great Salt Lake Minerals, Ogden, Utah. Personal communication, 1987.
- Harms, D. Acting field supervisor for the Endangered Species Field Office, Fish and Wildlife Enhancement. U.S. Fish and Wildlife Service. Personal communication, 1987.
- Harper, J.D. 1974. Forest Insect Control With *Bacillus thuringiensis*-Survey of Current Knowledge. Prepared by the Agricultural Experiment Station, Auburn University, Auburn, Alabama, for Abbott Laboratories, North Chicago, Illinois. 54 pp.
- Harris, J. 1987. Air quality specialist for the Environmental Protection Agency, Helena, Montana. Personal communication, 1987.
- Healy, J. March 16, 1987 memorandum concerning the 1987 Royal Teton Ranch Weed and Pest Control Program to Edward Francis, Business Manager, Church Universal and Triumphant, Corwin Springs, MT. 13 pp.
- _____. March 10, 1987 memorandum concerning the 1987 Royal Teton Ranch Weed and Pest Control Program to Edward Francis, Business Manager, Church Universal and Triumphant, Corwin Springs, MT.
- _____. March 16, 1987 memorandum concerning the Royal Teton 1987 Rodent Control Program to Edward Francis, Business Manager, Church Universal and Triumphant, Corwin Springs, MT.
- Houston, D. 1973. Wildfires in northern Yellowstone National Park. *Ecology* 54(5):1111-1117.
- _____. 1982. The Northern Yellowstone Elk--Ecology and Management. Macmillan and Company. 474 p.
- Huppe, K. 1987. Literature search Emigrant-Gardiner 69 kV. Edited by Elaine Howard. Highland Technical Services.
- Hydrometrics Consulting Scientists & Engineers. 1986. Aquifer testing and evaluation of a geothermal well at Royal Teton Ranch near Corwin Springs, Montana: Hydrometrics, 2727 Airport Rd., Helena, MT, 15 p. plus 5 appendices.
- Irby, L. 1986. Unpublished data. Montana State University, Bozeman, MT.
- _____. Professor and Bighorn Biologist, Montana State University, Bozeman, MT. Personal communication, 1987.
- _____, S. Stewart, and J. Swenson. 1986. Management of bighorn sheep to optimize hunter opportunity, trophy production and availability for nonconsumptive uses. In: Joslin, G. (ed.). Proceedings of the Fifth Biennial Symposium of the North American Wild Sheep and Goat Council. pp. 113-128.
- Jacob, C.E. 1963. Recovery Method for Determining the Coefficient of Transmissibility, Water Supply Paper 15361. U.S. Geological Survey,

Washington.

- Jasmine, A. 1963. Folsom and Clovis Projectile points found in southwestern Montana. Archaeology in Montana 5 (3).
- Javorsky, L. D. 1984. The trout fishery on a reach of the Upper Yellowstone River, Montana, during 1982. M.S. thesis, Montana State University, Bozeman, MT. 45 p.
- Keating, K. 1982. Population ecology of Rocky Mountain bighorn sheep in the upper Yellowstone river drainage, Montana/Wyoming. M.S. thesis, Montana State University, Bozeman, MT.
- Kistner, T. 1983. August 23, 1983 letter to D. Hebert, Regional Wildlife Biologist, Province of British Columbia, Williams Lake, B. C.
- Knight, R. Leader, Interagency Grizzly Bear Study Team, Bozeman, Montana. Personal communication, 1987.
- _____, D. Mattson, and B. Blanchard. 1984. Movements and habitat use of the Yellowstone grizzly bear. Mimeograph.
- Koehler, G. and M. Hornocker. 1986. A preliminary survey of mountain lions in Yellowstone National Park. Wildlife Research Institute, Moscow, Idaho. 12 p.
- Lahren, L. 1971. Archaeological investigations in the upper Yellowstone Valley, Montana: a preliminary synthesis and discussion. In: Stryd, A. and R. Smith (eds.). Aboriginal Man and Environments on the Plateau of Northwest America. Students Press, University of Calgary. p. 168-181.
- _____. 1976. The Myers Hindman site: An Exploratory Study of Human Occupation Pattern in the Upper Yellowstone Valley from 7000 B.C. to A.D. 1200. Anthro Research Inc., Livingston, MT.
- _____. 1971. Archaeological Investigations in the Upper Yellowstone Valley, Montana. A Preliminary Synthesis and discussion. In Aboriginal Man and Environments on the Plateau of Northwest North America, edited by A.H. Stryd and R.A. Smith, University of Calgary Archaeological Association, Calgary, Alberta, pp. 168-182.
- _____ and R. Bonnicksen. 1974. Bone foreshafts from a Clovis burial in southwestern Montana. Science 186:147-150.
- Lattman, L.H. and R.R. Parizek. 1964. Relationship between fracture traces and the occurrence of ground water in carbonate rocks: Journal of Hydrology, V. 2, p. 73-91.
- Lentsch, L. D. 1986. Fisheries inventory and instream flow requirements for Reese Creek, Yellowstone National Park. USFWS, Yellowstone National Park. 30 p.
- Leonard, R.B., T.M. Brosten and N.A. Medtlyng. 1978. Selected data from

thermal-spring areas, southwestern Montana: U.S. Geological Survey Open-File Report 78-438, 71 p.

Leopold, L.B. and J.P. Miller. 1954. A post-glacial chronology for some alluvial valleys in Wyoming. U.S. Geological Society Water Supply Paper 1261.

Lesica, P., G. Moore, K. Peterson, and J. Rumely. 1984. Vascular plants of limited distribution in Montana. Montana Academy of Science Monograph #2.

Lincoln, M.K. and W.E. Smith, P.E. 1987. Church Universal and Triumphant-Traffic Survey Report and Impacts on County Roads, Royal Teton Ranch, Corwin Springs, MT. 26 pp.

Logan, K. and L. Erwin. 1985. Mountain lion habitats in the Big Horn Mountains, Wyoming. Wildlife Society Bulletin 13:257-262.

Lyden, C.J. 1948. The Gold Placers of Montana. State of Montana, Bureau of Mines and Geology. Montana School of Mines. Memoir No. 26, Butte, MT.

Mahoney, D. Draft report 1987. Reese Creek. USFWS, Yellowstone National Park. 23 pp.

Marty, M. 1984. Pilgrims in Their Own Land: 500 Years of Religion in America. Boston: Little Brown.

Matson, D. and D. Despain. 1985. Grizzly bear habitat component mapping handbook for the Yellowstone Ecosystem. USDA-Forest Service/ USDI-National Park Service. Unpublished document.

_____. 1987. Plant Ecologist, Interagency Grizzly Bear Study Team, Bozeman, Montana. Personal communication, 1987.

Melton, J.G. 1978. Encyclopedia of American Religions. Wilmington, North Carolina: McGrath.

_____. 1986. Encyclopedic Handbook of Cults in America. New York: Garland Publishing, Inc.

Meyer, B., D. Anderson, R. Bohning, and D. Fratianne. 1973. Introduction to Plant Physiology. D. Van Nostrand Company, New York. 563 pp.

Miller, W.E., J.C. Greene and T. Shiroyama. 1978. The Selenastrum capricornutum Printz Algal Assay Bottle Test. EPA-600/9-78-018.

Miller, D.C. 1974. Ghost Towns of Montana. Pruett Publishing Company, Boulder, CO.

Montana Department of State Lands and U.S. Department of Agriculture-Forest Service. 1986. Jardine Joint Venture Project - Final Environmental Impact Statement. 533 pp.

- _____. 1985. Jardine Joint Venture Project - Draft Environmental Impact Statement. 272 pp.
- Montana Department of Commerce. 1985. Montana County Profiles - Park County. 55 pp.
- Montana Department of Fish, Wildlife and Parks. 1979. Southwest Montana fisheries investigations. Job Progress Rpt. F-9-R-33, I-c. 44 p.
- _____. Draft report 1987. Southwest Montana fisheries investigations. Job Progress Rpt. F-9-R-34, I-c.
- _____. 1986. Montana interagency stream fishery data. MDFWP, Helena, MT.
- _____. 1985. Southwest Montana fisheries investigations. Job Progress Rpt. F-9-R-33, I-c. 44 p.
- _____. 1984. Southwest Montana fisheries investigations. Job Progress Rpt. F-9-R-32, I-c. 38 p.
- _____. 1983. Southwest Montana fisheries investigations. Job Progress Rpt. F-9-R-30, I-c. 23 p.
- _____. 1982. Southwest Montana fisheries investigations. Job Progress Rpt. F-9-R-29, I-c. 27 p.
- _____. 1986. Montana interagency stream fishery data. MDFWP, Helena, MT.
- _____. 1980. Southwest Montana fisheries investigations. Job Progress Rpt. F-9-R-28, I-c. 35 p.
- _____. 1980. Southwest Montana fisheries investigations. Job Progress Rpt. F-9-R-27, I-c. 4 p.
- Morgenthaler, E. 1981. "Forbe's Profit from Mrs. Prophet Stirs Up Rancor in Paradise Valley," Wall Street Journal, Volume 105, Section 2, 29 p.
- Mountain International, Inc. 1984. Hard Rock Impact Mitigation Plan for Gardiner and Park County, Montana. Submitted to Homestake Mining Company and American Copper and Nickel Company for the Jardine Joint Venture Project. 157 pp.
- _____. 1984. Volume III - Existing Socioeconomic Conditions and Impact Analysis of Population, Services, and Public Finance in Livingston, Montana - Final Report. Submitted to Homestake Mining Company and Westech for the Jardine Joint Venture Project. 94 pp.
- _____. 1983. Jardine Area Project Existing-Draft Report Socioeconomic Environment. Submitted to Homestake Mining Company and Westech for the Jardine Joint Venture Project. 337 pp.
- Mueggler, W. and W. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA-FS Intermountain Forest and Range Experiment Station GTR-INT-66, Ogden, Utah. 154 pp.

- Mulloy, W.T. 1958. A preliminary historical outline for the northwestern plains. University of Wyoming Publications in Science 22(1).
- Nesbit, S. 1987. Personal communication - Historical and Archaeological. Livingston, MT.
- Newell, R. L. 1975. Aquatic invertebrates of Yellowstone River Basin, Montana. Tech. Rpt. No. 5 Yellowstone Impact Study. MDNRC, Helena, MT. 109 p.
- OEA Research. 1987. Wildlife. Report prepared for the Church Universal and Triumphant. 40 pp.
- _____. 1987. Vegetation. Report prepared for the Church Universal and Triumphant. 12 pp.
- _____. 1987. Fisheries/Aquatic Insects. Report prepared for the Church Universal and Triumphant. 17 pp.
- Oswald, R. A. 1982. A fisheries inventory of Bear Creek prior to proposed mineral mining at Jardine, Montana. Prepared for Homestake Mining Company, Golden, CO. Mine permit application. 22 p.
- Park County Historical Society. 1984. History of Park County, Montana. Taylor Publishing Company, Dallas, TX.
- Payne, G.F. 1973. Vegetative Rangeland Types in Montana. Department of Animal and Range Sciences, Montana Agricultural Experiment Station, Bozeman, MT.
- Pfister, R., B. Kovalchik, S. Arno, and R. Presby. 1977. Forest habitat types of Montana. USDA-FS Intermountain Forest and Range Experiment Station GTR-INT-34, Ogden, Utah. 174 pp.
- Phillips, G. Montana Department of Fish, Wildlife, and Parks. Personal communication, 1987.
- _____. September 16, 1987 memorandum concerning Fisheries/Aquatic Insects Section of the Royal Teton Ranch EIS to Tom Ellerhoff, Environmental Sciences Division, Department of Health and Environmental Sciences, Helena, Montana.
- Pool, B. "Sect Sells Calabasas Site to Japanese University," Los Angeles Times, July 5, Part I, 29 p.
- Powell, J.W. 1984. Geologic Atlas of the United States, Livingston Folio, Montana, U.S. Geological Survey, Department of the Interior, Washington, D.C.
- Prophet, E. The Lost Years of Jesus. Malibu, CA: Summit University Press.
- Puchlerz, T. Wildlife Ecologist, USDA-Forest Service, Gardiner Ranger District, Gardiner, Montana. Personal communication, 1987.

- Quivik, F.L. 1982. Historic Bridges in Montana. Prepared for the State of Montana Department of Highways by U.S. Department of the Interior, National Park Service, Historic American Engineering Record.
- Rantio, S.A. and J.L. Sonderegger. 1980. Annotated Bibliography of Geothermal Resources of Montana. Bulletin 110, Montana Bureau of Mines and Geology, Montana College of Mineral Science and Technology, Butte, MT.
- Reed , G.C. 1951. Mines and Mineral Deposit (Except Fuels) Broadwater County, Montana. Montana Bureau of Mines Information Circular 7592. United States Department of the Interior.
- _____. 1950. Mines and Mineral Deposits (Except Fuels) Park County, Montana. Montana Bureau of Mines and Geology, Information circular 7546.
- Reeves, B.O.K. 1969. Paleo-cultural paleo-environmental sequence. In Post Pleistocene Man and His Environment on the Northern Plains. University of Calgary Archaeological Association: 6-46.
- Rosen, M. No date. Pasteurellosis. In: Davis, J. L. Karstad, and D. Trainer (eds.). Infectious Diseases of Wild Mammals. The Iowa State University Press, Ames, Iowa. 244-252 pp.
- Ruppel, E.T. 1972. Geology of pre-Tertiary rocks in the northern part of Yellowstone National Park, Wyoming: U.S. Geological Survey Professional Paper 729-A, 66 p.
- Shelley, S. Plant ecologist for Montana Natural Heritage Program. Personal communication, 1987.
- Shepard, B, K. Pratt, and P. Graham. 1984. Life histories of west slope cutthroat trout and bull trout in the Upper Flathead River Basin, MT. EPA Region VIII, Denver, CO., Contract R008224-01-5.
- Sherwood, W. 1987. Personal communication - Historical and Archaeological. Butte, MT.
- Shoesmith, M. 1979. Seasonal movements and social behavior of elk on Mirror Plateau, Yellowstone National Park. In: Boyce, M. S. and L. D. Hayden-Wing (eds.). North American Elk: Ecology, Behavior and Management. University of Wyoming, Laramie. Wyoming.
- Singer F. 1987. Unpublished Yellowstone National Park pronghorn winter counts. Yellowstone National Park, Mammoth, Wyoming.
- _____. Wildlife Biologist, Yellowstone National Park, Wyoming. Personal communication, 1987.
- Skarr, P., D. Skarr, D. Flath, and L. Thompson. 1985. Montana bird distribution. Monograph No. 3, Montana Academy of Science Supplement to Proceedings Vol. 44. 69 p.

Smith, W.L. 1987. "Camelot: Can It Be Recreated in Paradise Valley?" Presented to the Association for the Sociology of Religion's annual meeting in Chicago, Illinois, August 15, 1987 by William L. Smith, PhD., Department of Sociology, Carroll College, Helena, MT. 13 pp.

Sonderegger, J.L. March 31, 1987 Informal Report concerning the potential effects of production from a geothermal well located near La Duke Hot Spring to the Montana Department of Health and Environmental Sciences and Department of Natural Resources and Conservation, Helena, MT. 12 pp.

"Sources and Quantities of Suspended Sediment in the Yellowstone River and Selected Tributary Watersheds between Yellowstone Lake Outlet, Yellowstone National Park, Wyoming, and Livingston, Montana", 1986 Preliminary Progress Report.

Stark, R. and W. Bainbridge. 1985. The Future of Religion. Berkeley, CA: University of California Press.

Stemp, R. 1982. Heart rate responses of bighorn sheep to some environmental factors. In: Joslin, G. (ed.). Biennial Symposium of North American Wildlife Sheep and Goat Council 3:314-319.

Stermitz, J. 1987. Personal communication - Historical and Archaeological. June 18, 1987.

Struhsacker, E.M., ms. 1976. Geothermal systems of the Corwin Springs-Gardiner area, Montana: Possible structural and lithologic controls: M.S. theses, Montana State University, Bozeman, MT, 93 p.

Sumner, J. Wildlife ecologist, Wildlife/Wildlands Institute, Missoula, Montana. Personal communication, 1987.

Swenson J. 1986. Job Progress Report for the Montana Department of Fish, Wildlife and Parks, Helena, MT.

_____. 1985. Job Progress Report for the Montana Department of Fish, Wildlife and Parks, Helena, MT.

_____. 1984. Job Progress Report for the Montana Department of Fish, Wildlife and Parks, Helena, MT.

Taylor, D.C. 1969. The Wilsall excavations: an exercise in frustration. Proceedings of the Montana Academy of Sciences 29:147-150.

_____. 1974. Forest fires in Yellowstone National Park. Journal of Forest History 18(6):68-77.

Thurston, R., R. Leudtke, and R. Russo. 1975. Upper Yellowstone River water quality August 1973-August 1974. Project No. A-081-MONT, Montana University Joint Water Resources Research Center.

U.S. Department of Agriculture - Forest Service. 1987. Noxious Weed

Control - Final Environmental Impact Statement. Gallatin National Forest, Bozeman, MT. 35 pp.

_____. Western Spruce Budworm, Forest Insect & Disease Leaflet 53.

U.S. Environmental Protection Agency. 1986. Quality Criteria for Water, 1986. EPA-440/5-86-001.

_____. 1975. Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Poultry Segment of the Meat Product and Rendering Process Point Source Category. EPA-440/1-75/031-b.

_____. 1974. Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Red Meat Processing Segment of the Meat Product and Rendering Processing Point Source Category. EPA-440/1-74-012-a.

U.S. Geological Survey. 1972. Geologic map of Yellowstone National Park: U.S. Geological Survey Miscellaneous Geological Inventory Map I-711.

U.S. Geological Survey Water-Resources Investigations Report 84-4063, "Streamflow Characteristics of the Yellowstone River Basin, Montana, Through September 1982".

U.S. Department of Interior - Fish and Wildlife Service. 1987. Letter from D. Harms, Threatened and Endangered Office, Helena, Montana, listing threatened and endangered species for the Royal Teton Ranch area.

U.S. Geological Survey Water Data Report MT-85-1, Vol. 1, "Water Resources Data, Montana Water Year 1985".

U.S. Department of Agriculture - Forest Service. 1985. Draft forest management plan. Gallatin National Forest, Bozeman, MT.

_____. 1984, 1985, 1986. Unpublished winter eagle counts. Gardiner District Office, Gardiner, MT.

_____. 1985. Resource area analysis, West Gardiner analysis, compartments 301, 302, 303. District Office unpublished document, Gardiner, MT.

_____. 1973. Cedar-Bassett environmental assessment. Gallatin National Forest, Bozeman, MT.

_____. 1987. Final forest management plan. Gallatin National Forest, Bozeman, MT.

U.S. Department of the Interior - Bureau of Land Management. 1985. Final EIS: northwest area noxious weed control program and supplement. Oregon State Office, Portland. 382 pp.

U.S. Department of Commerce. 1986. Current Population Reports: Local Population Estimates - West, 1984 Population and 1983 Per Capita Income Estimates for Counties and Incorporated Places, Series P-26, No. 84-W-

SC.

Unknown. 1975. U.S. Geological Survey Open-File Report 75-25.

Uttormark, P.D., J.D. Chapin, and K.M. Green. 1974. Estimating Nutrient Loadings of Lakes from Non-Point Sources. EPA-660/3-74-020.

Vandre, B. Engineer for U.S. Forest Service Region IV, Ogden, Utah. Personal communication, 1987.

Varley, J. Leader, Biological Research Office, Yellowstone National Park. Personal communication, 1987.

Vincent and Clancy. 1980. Fishing regulation evaluation on major trout waters. Project No. F-9-R-28, Job No. 11-c.

Wanielista, Martin P., 1978. "Stormwater Management, Quality and Quantity", Ann Arbor Science Publishers Inc., Ann Arbor, MI.

Weaver, J. 1978. The wolves of Yellowstone. USDI-National Park Service, Natural Resources Report No. 14. Mammoth Hot Springs, YNP, Wyoming.

Wedel, W.R., W.M. Husted and J. Moss. 1968. Mummy Cave: Prehistoric record from Rocky Mountains of Wyoming. Science 160:185-86.

Wernstedt, F. L. 1960. Climatic fluctuations in the Great Basin, 1931-56. Journal of Range Management 13:173-8.

Westech. 1984. Jardine area baseline terrestrial wildlife study. Report for Jardine Joint Venture. 289 p.

White, D.E., J.D. Hem and G.A. Waring. 1963. Data of geochemistry, sixth edition, Chapter F. Chemical composition of subsurface waters: U.S. Geological Survey Professional Paper 440-F, 67 p.

_____, R.O. Fournier, L.P.J. Muffler and A.H. Truesdell. 1975. Physical results of research drilling in thermal areas of Yellowstone National Park, Wyoming: U.S. Geological Survey Professional Paper 892, 70 p.

Witkin, G. 1982. "Let's Treat Them as Good Neighbors," U.S. News and World Report, July 5, 39-40 pp.

Witte, O. 1986. "Arch/Truss Retrofit Prolongs Life of Forest Service Bridge," Roads & Bridges - November 1986. 65 p.

Wolle, M.S. 1963. Montana Pay Dirt. A Guide to the Mining Camps of the Treasure State. Safe Books, Denver, CO.

Zison, S.W., K.F. Haven and W.B. Mills. 1977. Water Quality Assessment: A Screening Method for Nondesignated 208 Areas. EPA-600/9-77-023. 549 pp.

Zubik, R. J. 1983. The fishery of Hyalite Reservoir, Montana with an evaluation of cutthroat trout reproduction in its tributaries. M.S.

thesis, Montana State University, Bozeman, MT. 70 p.

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